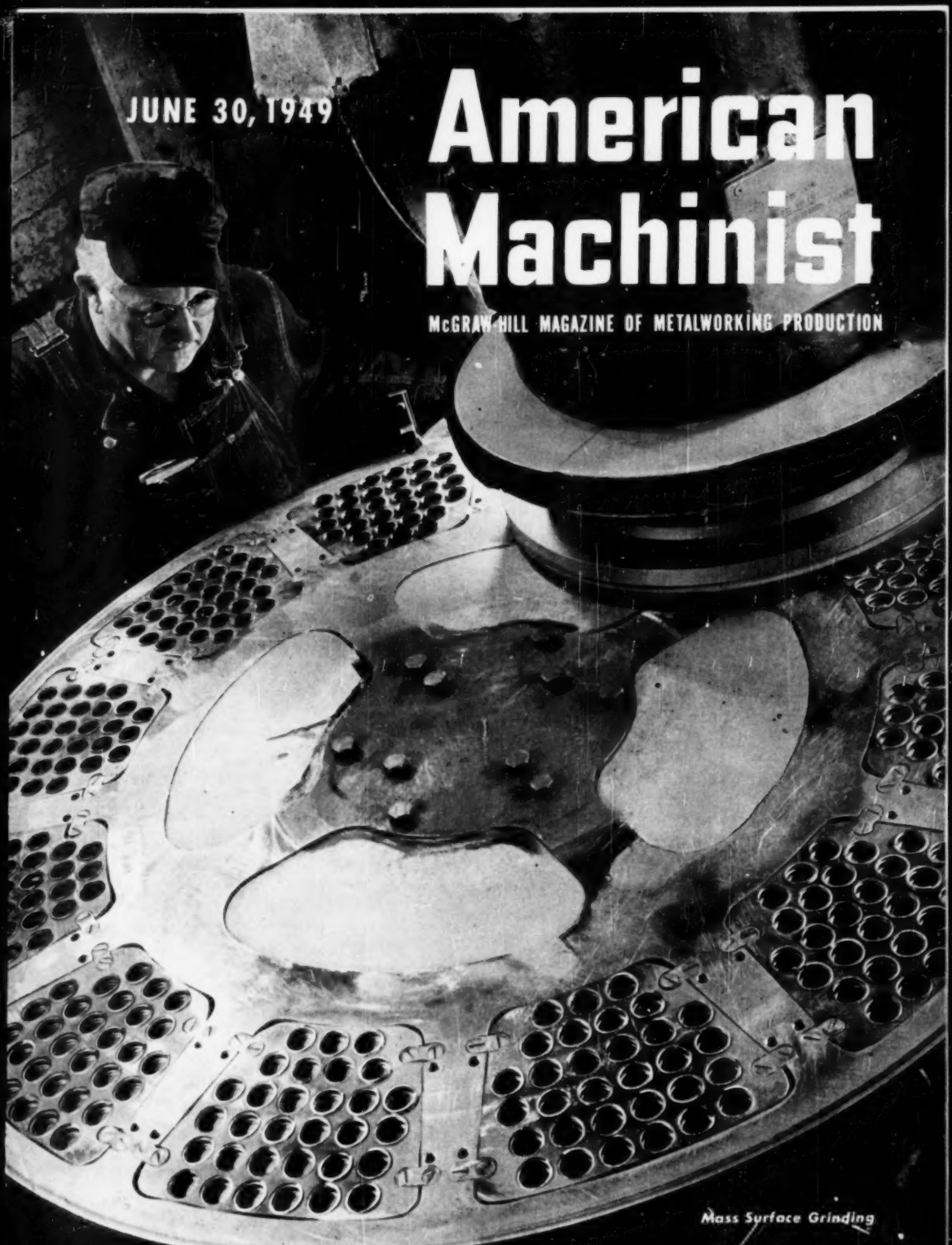
JUNE 30, 1949

American Machinist

McGRAW-HILL MAGAZINE OF METALWORKING PRODUCTION



Mass Surface Grinding

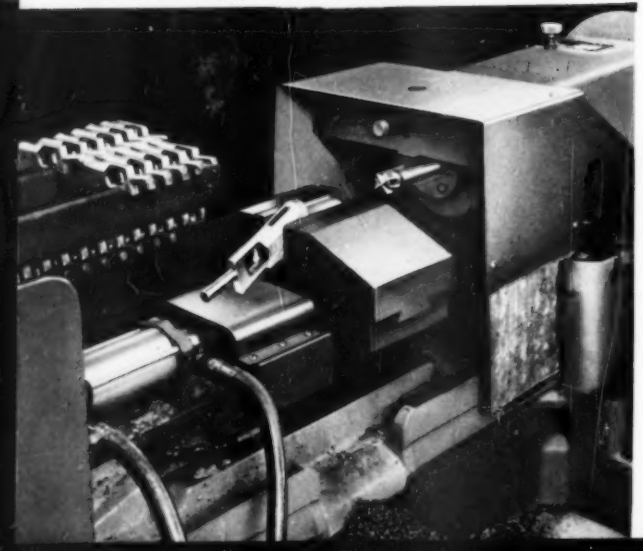
THREADING STAINLESS · PILOTS FOR PROGRESSIVE DIES

Production increased from 60 to:

100 PARTS PER HOUR!

This Heald Model 121 Bore-Matic is ideally suited to high production requirements on small work, like the parts shown below.

These malleable-iron gun barrel frames are bored and faced in one high speed automatic machine cycle. The four-lip end mill cutter and clamping fixture used are shown below.



Gun barrel frames now finished faster, easier, and at lower cost on a small Heald Bore-Matic

It doesn't always take a big machine to make a big difference in your production schedules. Here's a typical case where the smallest single-end Bore-Matic in the Heald line practically *doubled* production for a manufacturer of firearms.

The gun-barrel frames shown at the left were formerly bored and face-milled in a hand-feed machine, with a maximum output of from fifty to sixty parts per hour. But when the new Heald Model 121 Bore-Matic took over the job, production immediately jumped to one hundred parts an hour! The machine cycle is fully automatic—all the operator has to do is load and unload the parts and throw the starting lever. It's not only easier and faster, but produces a more even bore and a better finish.

Whatever the job, chances are there's a new Heald machine that can do as much, or more, for you. And there's a Heald representative near you who will be glad to show you how. Why not get in touch with him today?

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PRECISION INTERNAL AND SURFACE GRINDERS

PRECISION BORE-MATIC FINISHING MACHINES

THE HEALD MACHINE COMPANY

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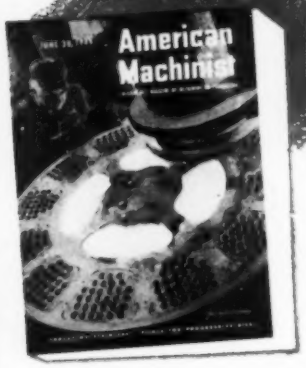


Chips and Quips

Our Cover . . . At Cuyahoga Spring Company, Cleveland, Ohio, a division of Barium Steel Corporation, compression springs must be faced at each end so faces are perpendicular to the axis of the helix. When the springs are coiled, coil ends are brought to bear against the closest body coil, but the spring would of course lean at an angle equal to half the spring-wire diameter unless faces are squared. This would result in bending or unequal loading of the spring and interference with proper functioning of the assembly incorporating the spring.

To avoid this, coiled springs are placed in drilled holes in holders in a carrousel or dial fixture. Holes are about 0.010 in. over spring diameter. The fixture carries the springs between abutting faces of two large-diameter abrasive wheels on the same vertical axis. These wheels produce end flatness and maintain proper over-all length. Wheels are adjustable to suit spring length and can be fed vertically automatically to attain a desired size.

Kodachrome by Robert Yarnall Richie.

Tool Men Note . . . We've several articles in this issue you won't want to miss. J. R. Paquin gives pointers on pilots for progressive dies. There's a way of avoiding a pit for a big broaching machine and some notes on machining radiator sections. Our cover shows a tricky tooling job on a grinder, and our Reference Book Sheets give turret-lathe machining times.

Filtration . . . H. R. LeGrand has been getting the lowdown on filtration of coolants for some months. The results of his study make our current Special Report. He doesn't include there some very special notes—such as the fact that filters clear the faked sea water in which lobsters live until you put the finger on 'em. And again, embalmers must have filters to take the solids from blood before the liquid can be discharged to the sewer. It's agin the law to pump blood directly into a sewage system. . . . Fascinating things one finds doing a Special Report.

Bulges . . . Just a year ago, at the SPI meeting in Atlantic City, a conventioneer suggested to us that Hotpoint in Chicago was doing a very tricky hydraulic-press job—bulging cooker pots. We put our Western Editor on the trail, have the story for you in this issue. It's worth the trouble.

Management-Wise . . . Don't miss the description of Frankford Arsenal's safety methods, the use of control charts for doing something positive about customer complaints, H. P. Bailey's series on portable tools. . . . And note the data on using the gas shielded arc and on grinding fine flat surfaces.

Speakers . . . In at least two recent cases, *A. M.* articles have resulted in speaking engagements. Elbert Kirkham of the University of Utah, who wrote our Special Report on "Rapid Identification of Alloy Steels" (Feb. 24), speaks on the same subject at Atlantic City June 28 under auspices of ASTM Committee E-3 on Chemical Analysis of Metals. Managing Editor Tangerman speaks on "Trends in the Philosophy of Teaching Mechanical Laboratory" before the teachers of this subject during the summer training course of the American Society for Engineering Education at Rensselaer Polytechnic Institute June 27.

Coming . . . *A.M.* for July 14 will begin with a description of investment cast milling cutters that do a real job. The Special Report will describe the Value Analysis procedure at G. E.—a way to save money all along the line on small parts. There'll be articles on cleaning a hydraulic system, or boring heavy cylinder liners, abrasives for super-finishing, conveyorized finishing, life tests for die materials, fixtures for welding aluminum and several others. It'll be an interesting mixed diet, stressing cost savings.

STAINLESS ENGINEER . . . J. J. Robert, assistant general manager of the Stainless Engineering & Machine Works, The Cooper Alloy Foundry Co., Hillside, N. J., has been in this department for 11 years. He has been active in the machining of stainless for 15 years and is considered by the trade as a leading designer of special machines and tooling for this work. He has also had much to do with intricate setups. He is a graduate of Newark (N. J.) College of Engineering.

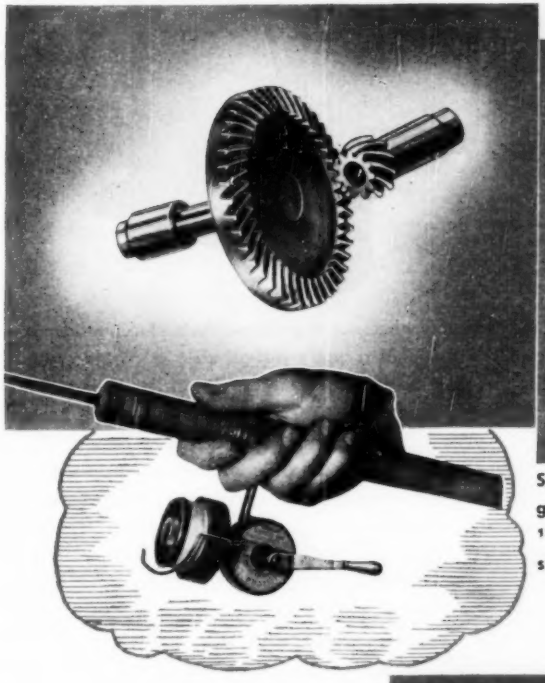
Mr. Robert says there's nothing to be afraid of in threading stainless, and goes on in this issue to show how careful selection of equipment and tool material and special attention to operator training result in high output rates and uniform quality.

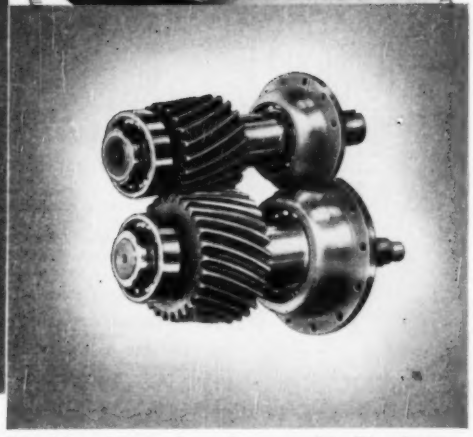
HAVE YOU INVESTIGATED USING BEVEL AND HYPOID GEARS?

Bevel gears to transmit power and motion "around a corner" can be produced to satisfy any angular requirements. Gleason engineers will recommend the correct type of gear for your use and help you with their design and mountings.

Two applications where accurate bevel gears perform an outstanding service are shown below.

The spinning reel, using a pair of sturdy, precision-cut spiral bevel gears provides the angler with many satisfied hours of smooth, noiseless casting.





Spiral bevel gears have been used in Diesel sea-going yachts for engines-in-stern propulsion since 1934. The original installation has never required servicing . . . yet they outlasted two pairs of engines.

Write for literature on the design and manufacture of bevel gears.

As builders of bevel gear machinery for the manufacture of straight bevel, spiral bevel, Zerol bevel and hypoid gears, we offer to help you with your bevel gear design problems . . . to furnish estimates of production time and costs . . . and to suggest the right equipment for your requirements.

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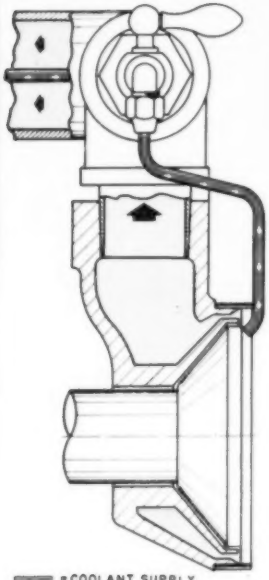
NEW Mist Type Coolant Equipment•••

OFFERS DUAL ADVANTAGES OF WET AND DRY GRINDING for sintered Carbide Cutters

New Mist Type Coolant Equipment attached to CINCINNATI No. 2 Cutter and Tool Grinder. Complete details are contained in publication M-1672.



Sectional drawing shows how the Mist Type Coolant Equipment takes the coolant on a round trip to the grinding wheel and return.

Coolant is good for diamond wheels... it prolongs their life. It produces a better surface finish, too. But until recently wet grinding of carbide cutters was a messy, disagreeable job for the operator. Cincinnati Milling Engineers overcame this objection by developing a Mist Type Coolant System for CINCINNATI No. 2 Cutter and Tool Grinders. ¶ This new attachment is completely self-contained. It consists of a double wall wheel guard which is connected by a large diameter flexible tube to a floor unit comprising a coolant tank, pump, and suction fan. A small diameter tube within the large flexible tube supplies a thin stream of coolant to the wheel. Upon contacting the rapidly rotating wheel, the coolant is transformed into a mist. The suction fan returns it through the wheel guard and tube to the coolant tank. Thus, the grinding operation is wet... the work, machine, and operator are dry. ¶ With a CINCINNATI No. 2 Cutter and Tool Grinder and Mist Type Coolant Equipment you can grind sintered carbide cutters more quickly and efficiently. An attractive leaflet gives you additional information on this Equipment. Ask for publication No. M-1672.

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THE CINCINNATI MILLING MACHINE CO.

CINCINNATI 9, OHIO, U. S. A.

MILLING MACHINES • BROACHING MACHINES • CUTTER SHARPENING MACHINES
FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

Part ground on . . .

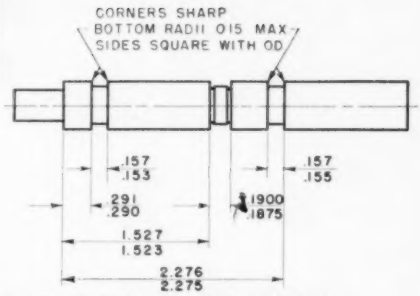
CINCINNATI FILMATIC 4″ PLAIN HYDRAULIC

Helps Effect Big Saving in Aircraft Engine Gas Consumption

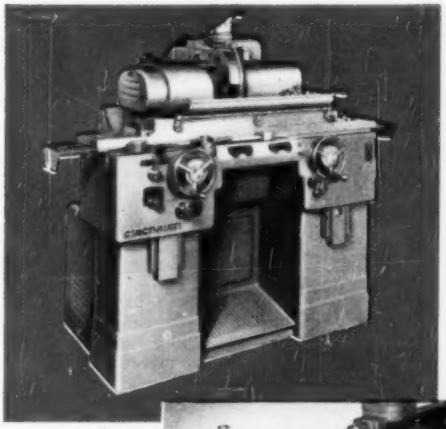
These were the requirements:

- ✓ Grind 3 grooves in a heat-treated stainless steel plunger for fuel injection unit
- ✓ Spaced within a half-thousandth
- ✓ Width held to a thousandth

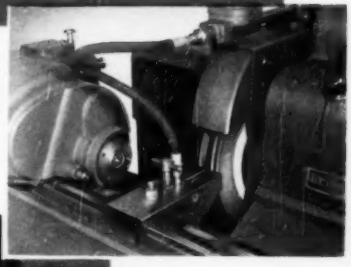
A CINCINNATI FILMATIC 4″ Plain Hydraulic Grinder was tooled up to do the job. And to speed up production as well as to reduce margins of error, it was decided to grind the 3 grooves simultaneously from the solid. ¶ The part is the plunger in a hydraulic device—the heart of a special fuel injection unit on the engines of B-29's. How successful the grinding operation was may be judged from the report that 40 gallons of fuel were saved per hour per engine, or 160 gallons per plane. ¶ The CINCINNATI FILMATIC 4″ Plain Hydraulic has many features which make it ideal for grinding a wide range of small work. And it has for its heart the same phenomenally dependable FILMATIC spindle bearings as in all other Cincinnati Grinding Machines. We'll be glad to send you complete details on the features of this machine and their benefits. Write for catalog G-551-1.



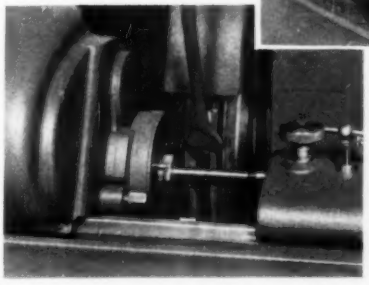
Drawing of part showing dimensional requirements.



Above: CINCINNATI FILMATIC 4″ Plain Hydraulic Grinding Machine. Catalog G-551-1 contains complete specifications.



Above: In this view the truing attachment is mounted and connected to the coolant supply.



Left: The plunger shown mounted on the CINCINNATI FILMATIC 4″ Plain Hydraulic Grinding Machine which did the job.

CINCINNATI

CINCINNATI GRINDERS INCORPORATED

CINCINNATI 9, OHIO, U. S. A.

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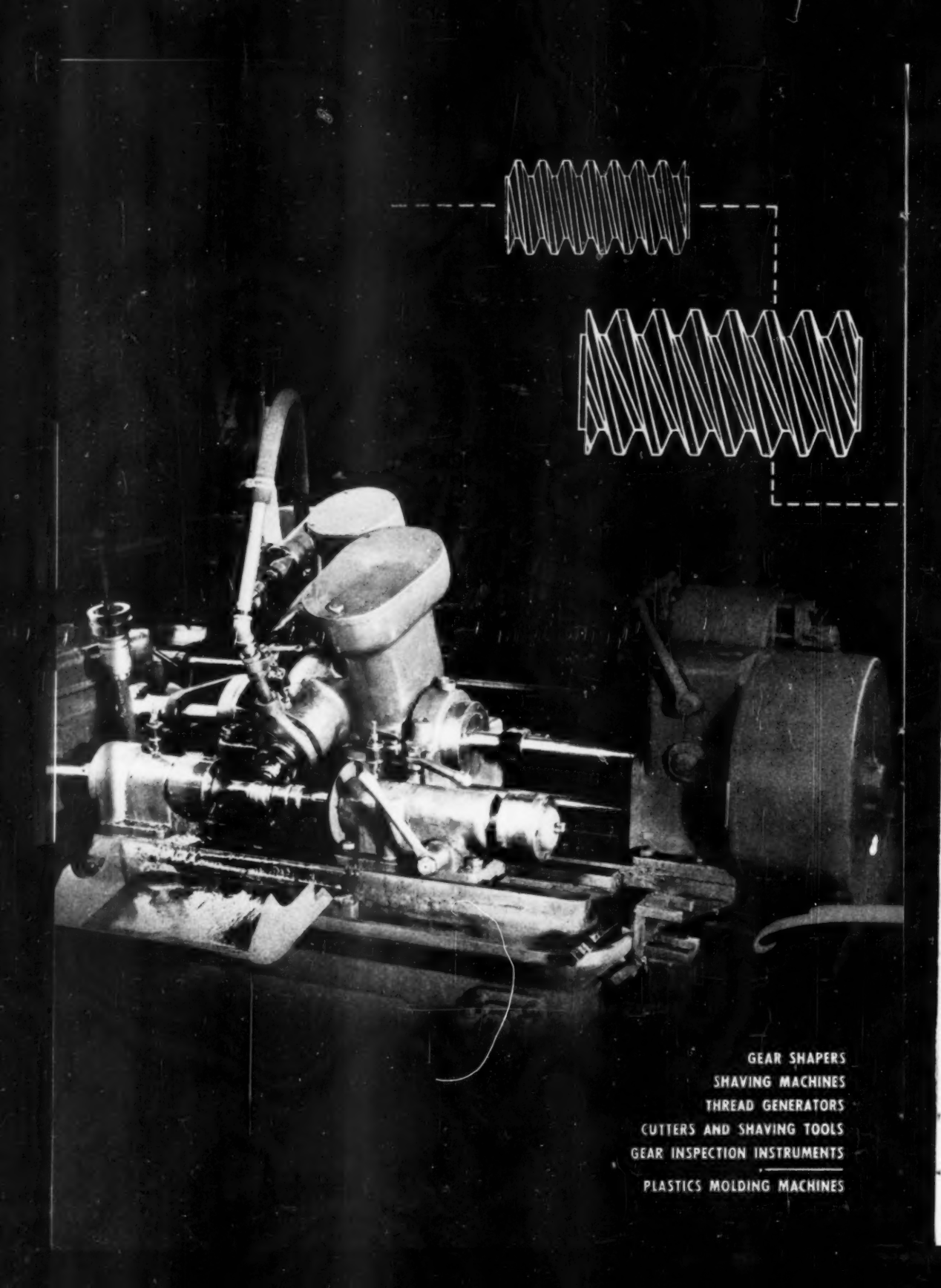


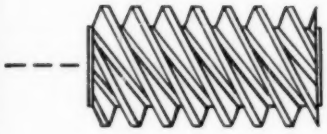
GEAR SHAPERS
SHAVING MACHINES
THREAD GENERATORS
CUTTERS AND SHAVING TOOLS
GEAR INSPECTION INSTRUMENTS

PLASTICS MOLDING MACHINES

3 to 5 times FASTER with the THREAD GENERATOR

Threaded work on a production basis is possible through the high-speed cutting and flexibility of the Fellows Thread Generator. Here is a machine that is truly a "cost saving specialist" in the production of threads and worms. Here is a typical performance:

Material cold rolled steel Outside dia. 1.775 Diametral pitch 24/48
Face width ..... 0.875" Straight worm, 20° pressure angle.
Five blanks mounted on arbor are cut at one time. One man runs 4 machines.
PRODUCTION: 59 WORMS PER HOUR! PER MACHINE



Single, double, triple or multiple thread "straight worms" . . . cut in one operation.

While producing worms at such high rates of speed, the finish is extremely smooth; accuracy of thread shape is inherent in the Fellows thread generator cutter, resharpened by simple face grinding.

Machines are built for work up to 4" O.D., 12" length. For more information on the production possibilities of the Fellows Thread Generator contact our nearest office.

Fellows

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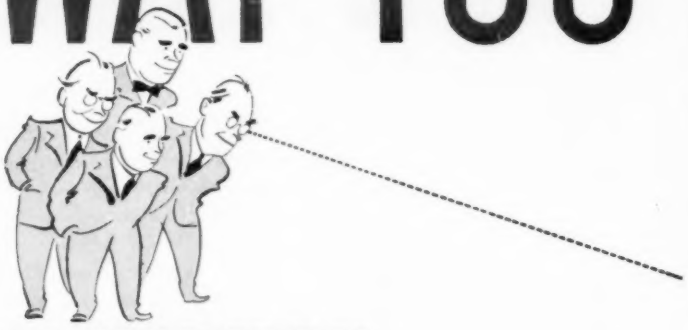

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Ram Type Milling Machines

- ★ **Are Easy to Operate**
- ★ **Cut Down Idle Time**
- ★ **Multiply Machine Output**

From any point of view, management, production, or operator . . . Van Norman Ram Type Millers meet every milling requirement from accurate work to maximum production and economy.

- *Adjustable Cutterhead* permits conventional horizontal and vertical as well as angular milling all on one machine . . . minimizes work setups . . . cuts idle machine time. In addition, this versatility enables you to meet job to job milling requirements.
- *Increased Range* — the adjustable cutterhead and movable ram provide maximum milling capacity and versatility.
- *Front and Rear Finger-tip Controls* of all power feeds, six way rapid traverse and hand adjustments provide extreme ease of control . . . reduce worker fatigue . . . increase output. Power controls operate in the desired table, saddle and knee movement assuring maximum simplicity of operation.
- *Single Lever Feed Selector* provides quick, easy selection of the proper feed for the type of work being milled. 18 feeds are instantly available from front or rear operating position.
- *Long Life Accuracy* is assured by precision Van Norman construction. Hardened alloy steel gears and multi-splined shafts operate on anti-friction bearings . . . automatic lubrication assures thorough oiling of all moving parts . . . massive knee, saddle and table assemblies provide rigidity.

Investigate Van Norman Ram Type Millers today. They are available in many models and sizes, with plain or universal saddles, to meet every requirement for toolroom, laboratory, machine shop, pattern shop, and general purpose milling.

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Springfield 7, Massachusetts

"It pays to Van Normanize"

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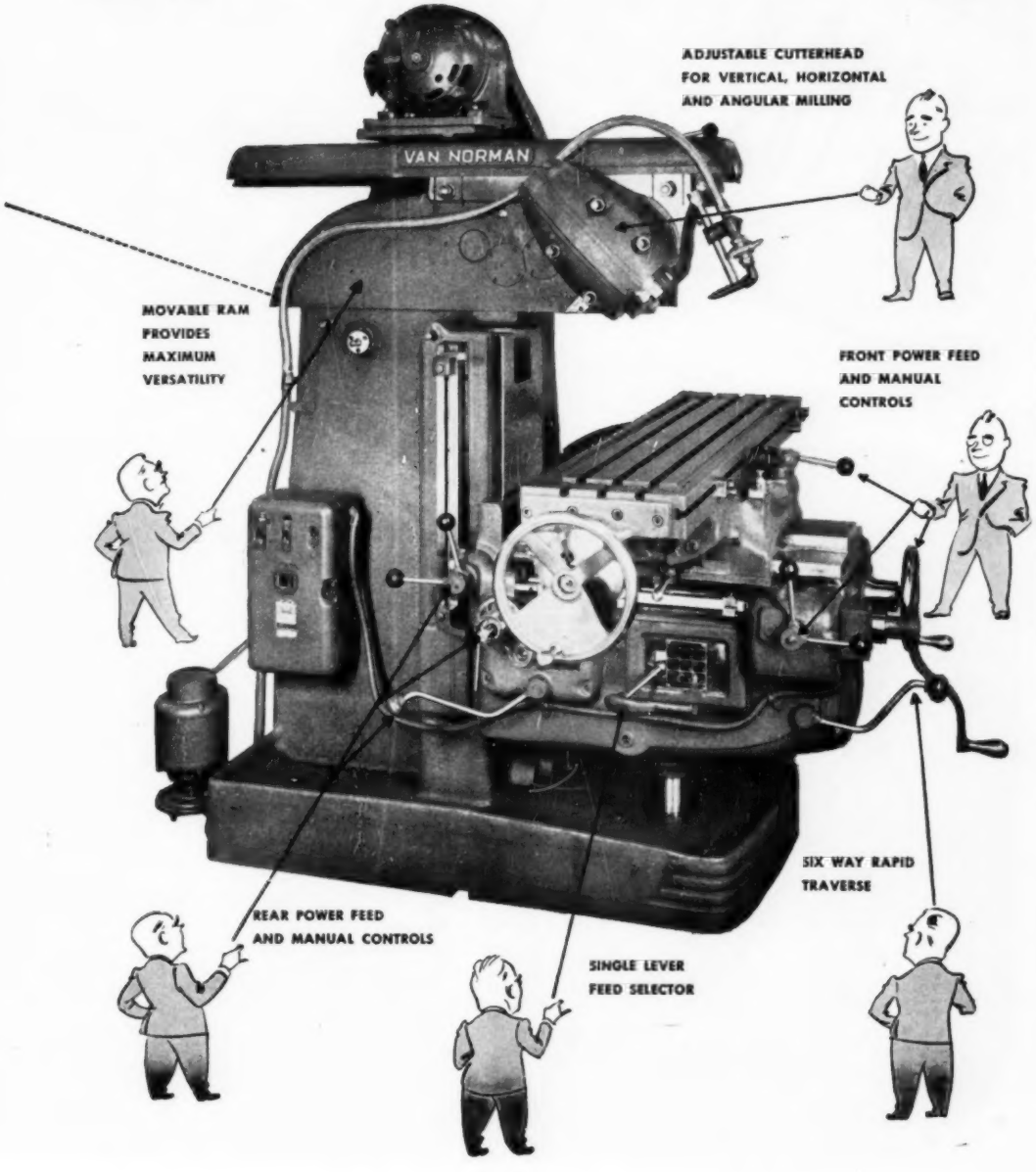

ADJUSTABLE CUTTERHEAD
FOR VERTICAL, HORIZONTAL
AND ANGULAR MILLING
VAN NORMAN
MOVABLE RAM
PROVIDES
MAXIMUM
VERSATILITY
FRONT POWER FEED
AND MANUAL
CONTROLS
SIX WAY RAPID
TRAVERSE
REAR POWER FEED
AND MANUAL CONTROLS
SINGLE LEVER
FEED SELECTOR

THREADING PROBLEMS?

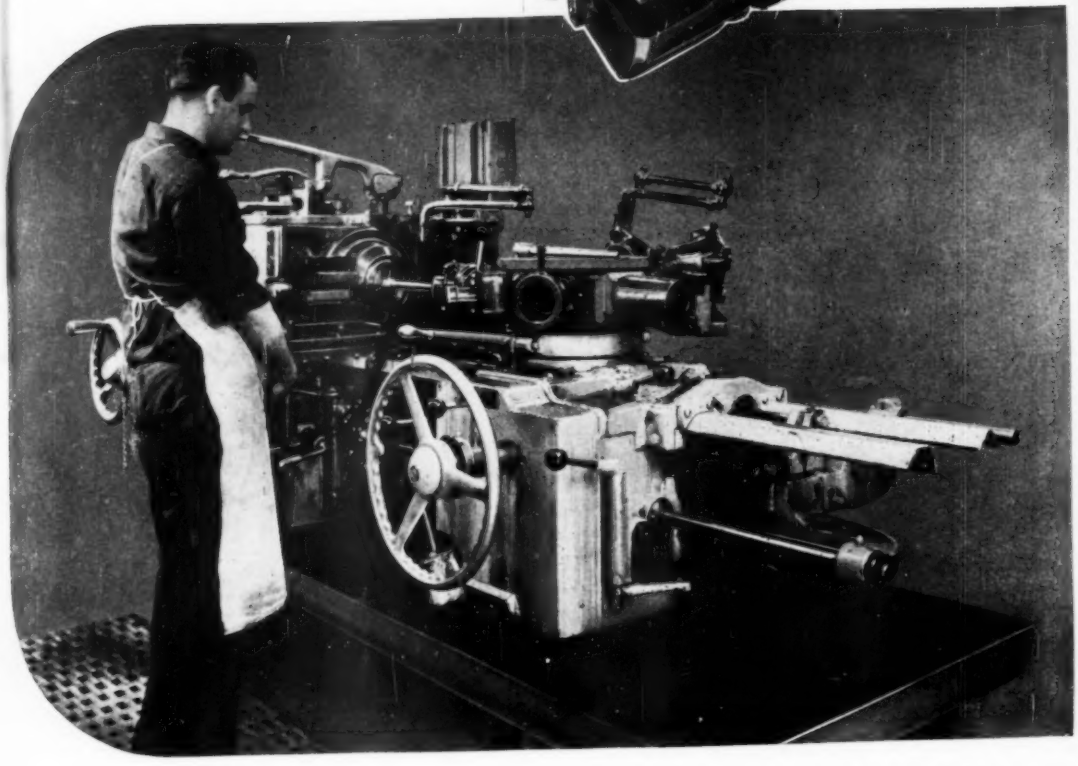
PRODUCTION?
ACCURACY?
ECONOMY?

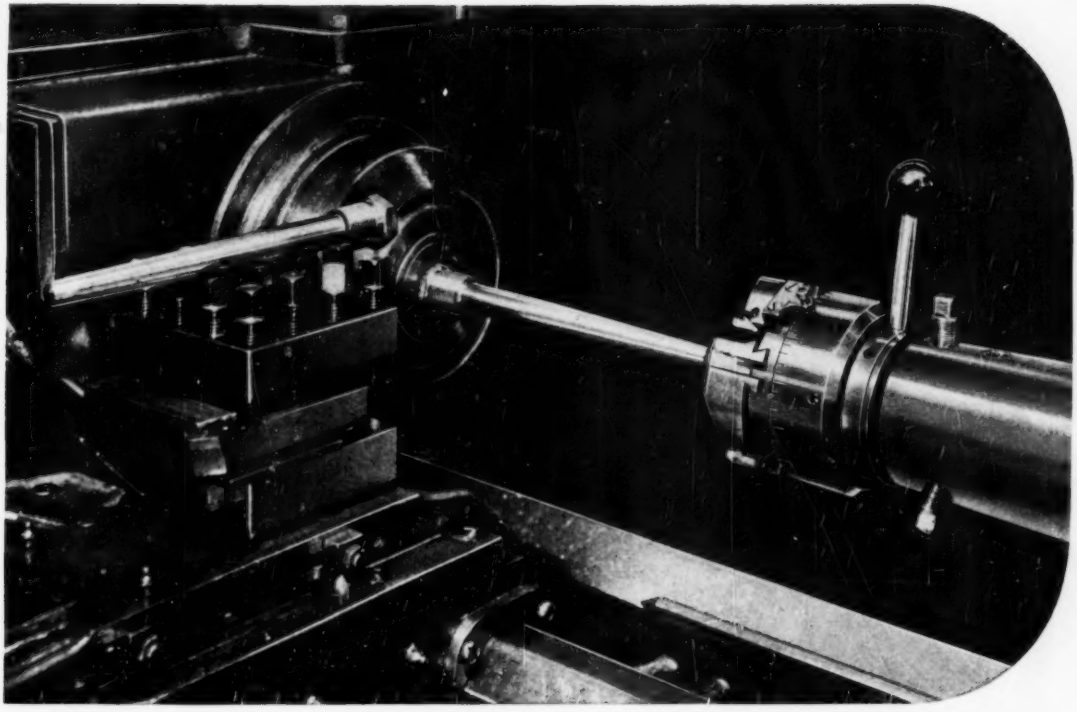
The Solution

LANDMATIC HEADS HARDENED & GROUND

For TURRET LATHE Threading Operations

LANDIS TRADE MARK REG. U.S. PAT. OFF.





The LANDMATIC 1¼" Hardened and Ground Die Head is illustrated cutting a ¾" pipe thread on a turret lathe in the plant of a nationally-known precision instrument manufacturer. The Drilled Sockets being machined in the illustrations are used with pressure type thermometers as a protecting sheath for the thermometer bulb. These parts are also made in 1" and 1¼" sizes.

The Type H LANDMATIC Die Head is a stationary self-opening die head designed for turret lathes and automatic screw machines employing a stationary type head. It is made in ⅝", ⅞", and 1¼" sizes. The 1¼" size illustrated will cut pipe threads ranging from ⅛" to ¾" in diameter. The LANDMATIC Type H Die Heads can be equipped with oversize chaser holders which make possible the threading of diameters larger than the rated capacity of the die head.

Write for Bulletin F-80

The LANDIS CHASER

The Finest Thread Cutting Tool in Industry

LANDIS MACHINE COMPANY

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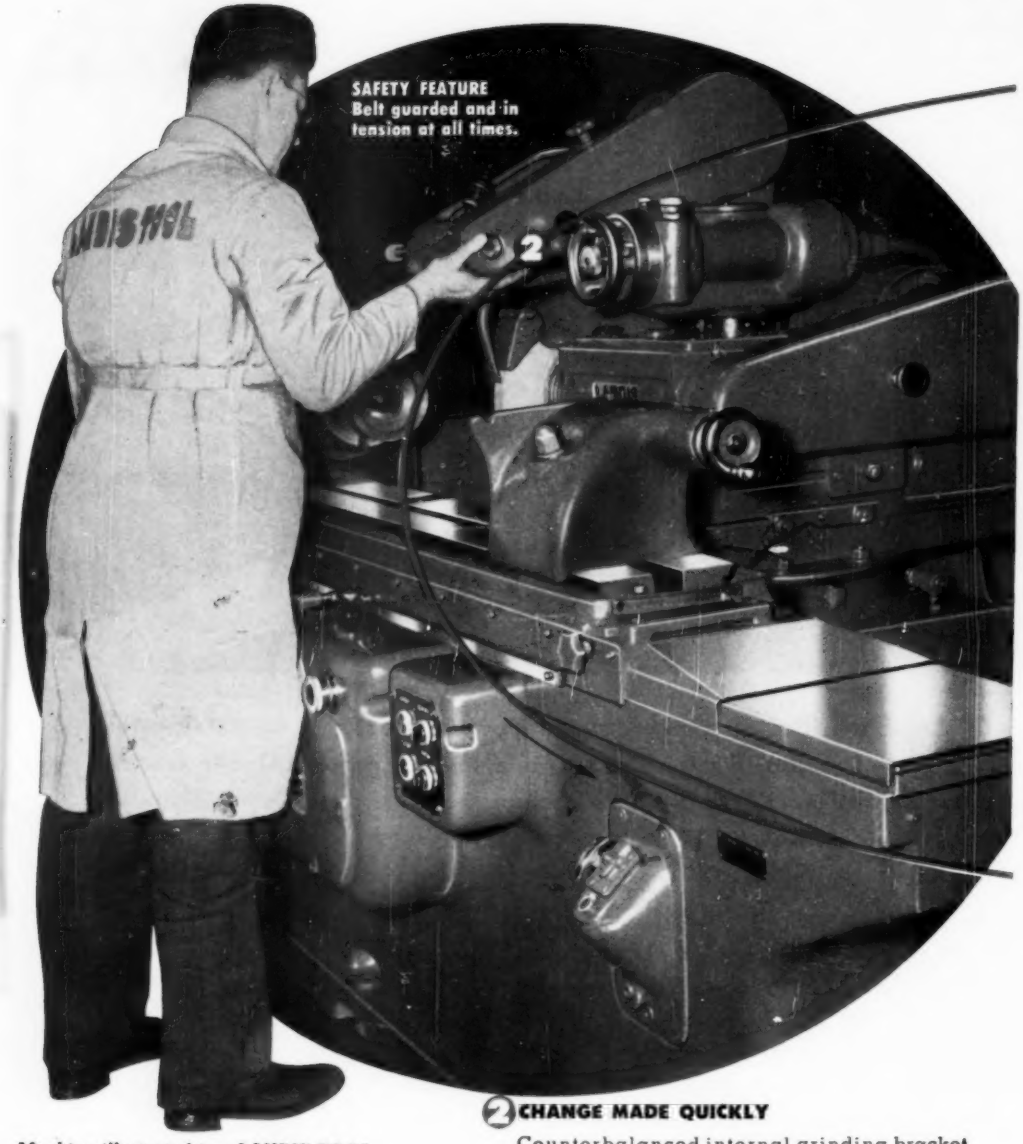


Machine illustrated is a LANDIS TOOL 12" LCH Hydraulic Universal Grinder.

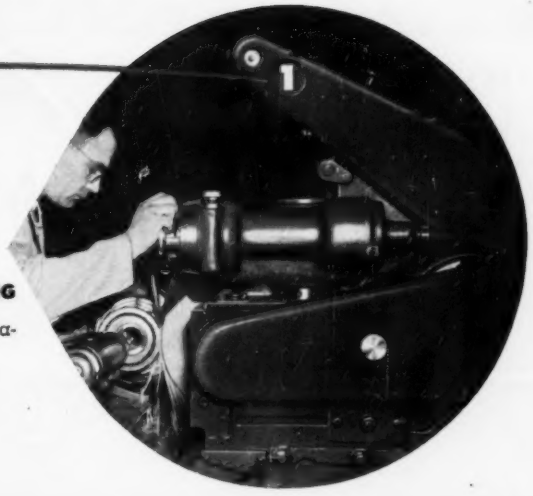
2 CHANGE MADE QUICKLY

Counterbalanced internal grinding bracket readily moved into grinding position.

LANDIS TOOL *Precision Grinders*

EQUIPPED WITH MICROSPHERE BEARINGS

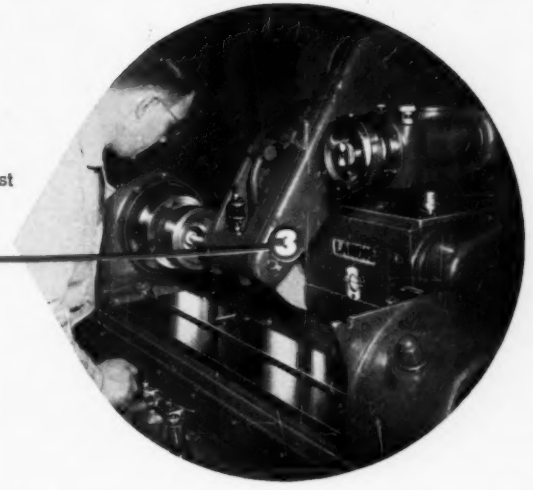
For complete information on the features and specifications of LANDIS TOOL Precision Grinders refer to our section in Sweet's Catalog File or write for our new condensed catalog.



1 EXTERNAL CYLINDRICAL GRINDING

Fixture does not interfere with operator's head or vision.

QUICK CHANGING from external to internal grinding on LANDIS TOOL Universal Grinders



3 INTERNAL GRINDING

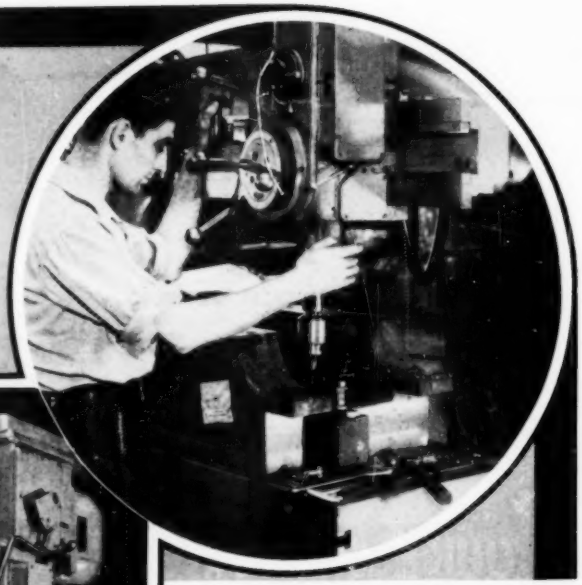
Rigid bracket locked in place with twist of knob.

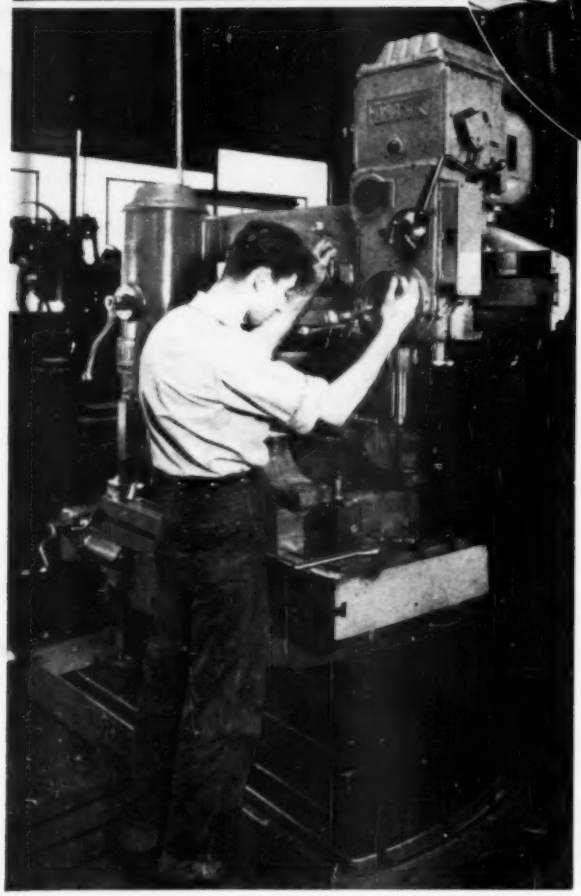
features of LANDIS TOOL Hydraulic Universal Grinders

1. MICROSPHERE WHEEL SPINDLE BEARINGS
2. EYE LEVEL WHEEL FEED
3. HYDRAULIC OPERATION
4. VARIABLE SPEED HEADSTOCK
5. RAPID HYDRAULIC WHEEL POSITIONING
6. SWINGING INTERNAL FIXTURE

LANDIS TOOL COMPANY / WAYNESBORO, PENNA.

It's easy to drill and tap various diameters ON THE FOSDICK *Sensitive* RADIAL





● Because of the unique design which combines sensitive drilling and the utility of radial construction in one machine the FOSDICK Sensitive Radial is proving a most convenient and cost saving machine tool.

For example, on the job shown a hole is being tapped on one section of the work and a small hole is being drilled on another section of the piece at the Bayer Machine Co. plant, Jackson, Michigan.

One of the outstanding features of this machine is the elevating table which is adjustable on the column. This insures locating the work in the proper position for the job at hand. Another advantage is the swing of the table and the arm in an arc of 360°.

Note, too, the arm at fixed height is easily reached from operator's normal position. The head of simple design provides nine speeds and four feeds. Control levers for both feeds and speeds are direct reading. Hence the operator has complete control at his fingertips.

On many of your jobs requiring sensitive drilling you will find it more economical to use a FOSDICK Sensitive Radial. For complete details write for the new FOSDICK Sensitive RADIAL Bulletin SRA.

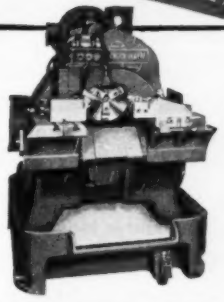
FOSDICK MACHINE TOOL *Company*
CINCINNATI 23, OHIO

PROOF—you can get finished parts FASTER with the new Acme-Gridley 12" Chuck-matic

This new single spindle chucker is built for heavy-duty cutting and a minimum of idle time for loading and unloading.

The typical machine times shown above aren't theoretical. They're only a few examples of the kind of work (both short and long run) you can turn out in less time—accurately—at lower cost.

If you're doing heavy-duty chucking work, you'll be interested in a new book we've prepared. It shows 16 jobs similar to the one above—all done on the Chuck-matic. Ask for bulletin SC 46-A.



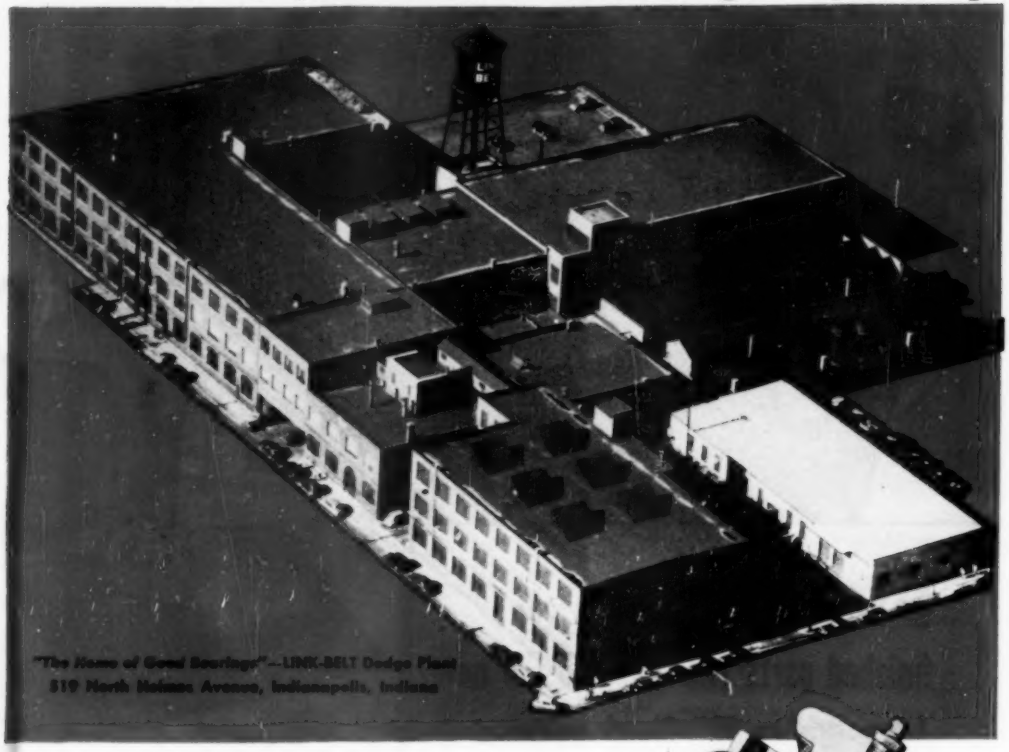
The rugged, powerful Chuck-matic is built for speeds and feeds as fast as carbide-tipped tools can take it. Compact, yet simple in design, its operation is semiautomatic. An unskilled operator can run as many as four machines.

The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

One LINK-BELT Plant devoted *Solely* to bringing you better bearings—*Quickly*



"The Home of Good Bearings"—LINK-BELT Dodge Plant
519 North Holmes Avenue, Indianapolis, Indiana

Meeting industry's ever-increasing demands for ball and roller bearings that offer the desired combination of free-rolling action, self-alignment, and long life is no small-sized job.

That's why the entire capacity of Link-Belt's Dodge Plant in Indianapolis is devoted to this important task.

From the receipt of housing castings furnished by sister plant foundries to shipment of finished mounted bearings, alert design engineers, skilled craftsmen and the most modern bearing production machinery work hand-in-hand to turn out the bearings that enable users to TURN SHAFTS EFFICIENTLY.

Cut-away view of Series 200 Ball Bearing Pillow Block

LINK-BELT COMPANY

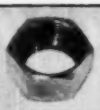
Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Dallas 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8.
Distributors in Principal Cities

11,387

LINK-BELT

Ball and Roller BEARINGS

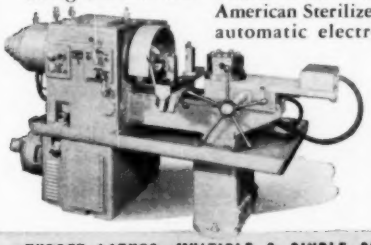
PRODUCTION RECORD

PART	PART NAME	OPERATIONS	PRODUCTION	COST	NOTES
	½" UNION NUT	TAP, BORE, CHAMFER, CUT OFF	UP 112.9%	DOWN 52.7%	CHANGE FROM CASTING TO BAR STOCK–ELIMINATE MILLING OPERATION
	½" FEMALE SPUD	BORE, TURN, TAP, SEAT	UP 44.2%	DOWN 30.8%	COMBINATION TOOLING
	¾" MALE SPUD	TURN, THREAD, SEAT	UP 38.2%	DOWN 26.8%	COMBINATION TOOLING
	½" GLOBE VALVE BODY	TURN, THREAD, SEAT	UP 25.0%	DOWN 20.4%	COMBINATION TAPPER AND THREADER
	VALVE REGULATOR VALVE BODY	BORE, TAP, THREAD	UP 44.4%	DOWN 32.3%	COMBINATION TAPPER AND THREADER
	TOP FLANGE CONTROL VALVE	DRILL, TAP, TURN, FACE, THREAD, CHAMFER	UP 121.1%	DOWN 56.3%	COMBINATION TURN AND FACE
	1" FLOOR FLANGE	DRILL, TURN, THREAD	UP 116.7%	DOWN 53.0%	COMBINATION TURN, FORM AND FACE

Electro-Cycle BOOSTS PRODUCTION 70.5% at American Sterilizer

● This chart shows what happened on seven typical brass jobs when the American Sterilizer Company of Erie, Pennsylvania, routed them to its new Warner & Swasey 16" Electro-Cycle Turret Lathes.

Using semi-skilled instead of skilled operators, American Sterilizer found that automatic electronic head-stock control and faster, easier machining raised production an average of 70.5% and dropped costs 38.9%!



Find out how the Warner & Swasey Electro-Cycle Turret Lathes can boost output and cut costs for you. Call your nearest Warner & Swasey representative or write—

You can machine it better, faster, for less... with a Warner & Swasey

WARNER & SWASEY Machine Tools *Cleveland*

TURRET LATHES, MULTIPLE & SINGLE SPINDLE AUTOMATICS, PRECISION TAPPING AND THREADING MACHINES

Here's a wheel that's Cutting

It's the NORTON 57A60-M5VBE*

20" diameter wheels grinding steel parts [illegible] to 2½" diameter.

Abrasives · Grinding Wheels · Grinders and Lapping Machines · Refractories · Porous Mediums · New and Exotic Products · Labeling Machines

Centerless Grinding Costs

YES, in hundreds of plants they are finding that this Norton wheel —the 57A60-M5VBE*—has just the right characteristics to give the lowest possible costs on their centerless grinding jobs. Its sharp, tough 57 ALUNDUM abrasive and BE bond combine to give both a *fast cutting action* and *long life*.

But this wheel may not be the answer to *your* particular centerless jobs. You may need the extra sharpness of the sensational new 32 ALUNDUM abrasive or the extra toughness of regular ALUNDUM abrasive, or even a hard, sharp silicon carbide like CRYSTOLON abrasive. But whatever *your* centerless grinding jobs may be, you can be *sure* that the Norton line includes a wheel that will do each one at *minimum cost*—a wheel with exactly the right combination of abrasive, bond, grain, grade and structure.

And you can also be sure that, handy to you, there's a Norton abrasive engineer or a Norton-trained distributor man to see that you get the right wheel on each job. Get in touch with him right away for lower grinding costs.

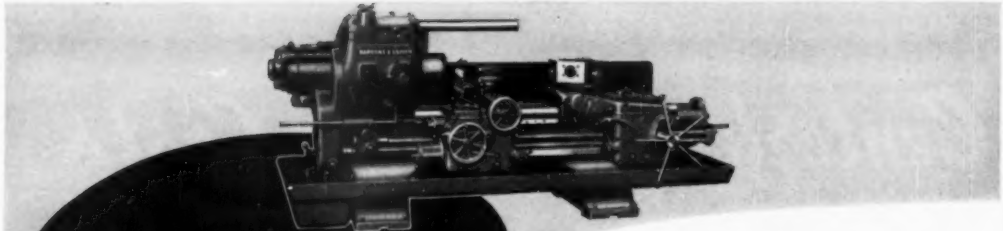
W-1248

REGULATING WHEELS A801-ROR-30

Equally popular is this Norton rubber bonded regulating wheel. It has a positive driving action, wears evenly and has long life. Available in harder and softer grades if your jobs require them.

NORTON ABRASIVES

NORTON COMPANY, WORCESTER, MASS. New York, Chicago, Detroit, Cleveland, Philadelphia, Pittsburgh, Hartford, St. Louis, Los Angeles



Outstanding Ease of Control..

MEANS GREATER PRODUCTION from the Bardons & Oliver No. 21 Saddle Type Turret Lathe

Any speed change can be made hydraulically in an average time of two seconds. The spindle speed is preselective. Power traverse to turret saddle and cross slide carriage is easy to control and saves operating time. The hydraulic collet chuck has ample power for heaviest feeds, and combined with the hydraulic bar feed, reduces operating effort while saving time.

These and many more time and labor saving features combine to make THE NO. 21 SADDLE TYPE TURRET LATHE outstanding for both bar and chucking work.

A blue print or sample of your work will permit our engineers to offer their recommendations.

Builders of a complete line of Ram and Saddle Type Turret Lathes, also Hydralectric, Hydraulic and Hand Operated Cut-Off Machines

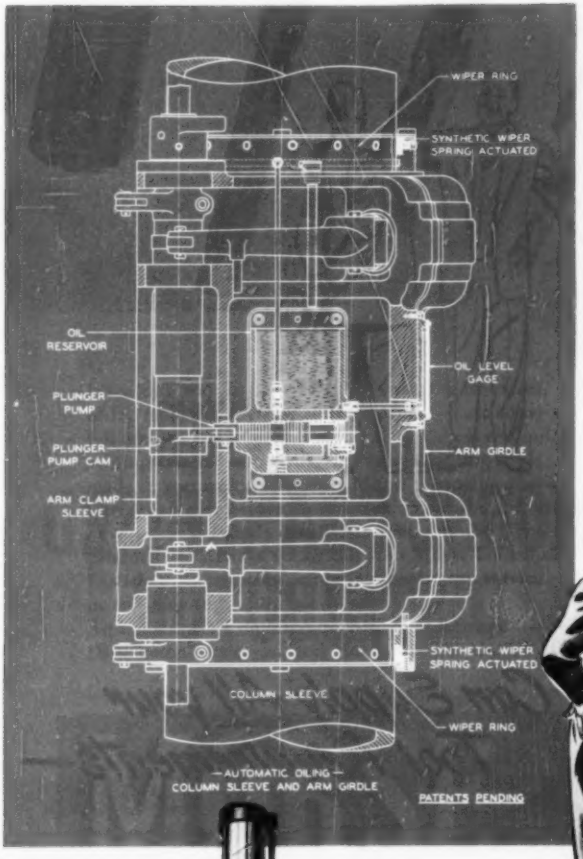
BARDONS & OLIVER, INC.

1133 WEST 9TH STREET • CLEVELAND 13, OHIO

Just a memory now

Column Scoring a thing of the past...

We've done something about it—



On the new "AMERICAN" Hole Wizard Radial the arm girdle and its mating column area are automatically oiled and cleansed.

Actuation of the elevating lever operates a plunger pump in the arm girdle forcing oil into the distributing reservoir at the top which lubricates the entire arm girdle area. Abrasion and oil resistant synthetic wipers at top and bottom trap the oil to prevent leakage and thoroughly cleanse the column of all dirt and foreign matter ahead of the arm girdle when raised or lowered.

This positively reduces the danger of column scoring to an absolute minimum — just another "Hole Wizard" feature that insures long life and dependable service.

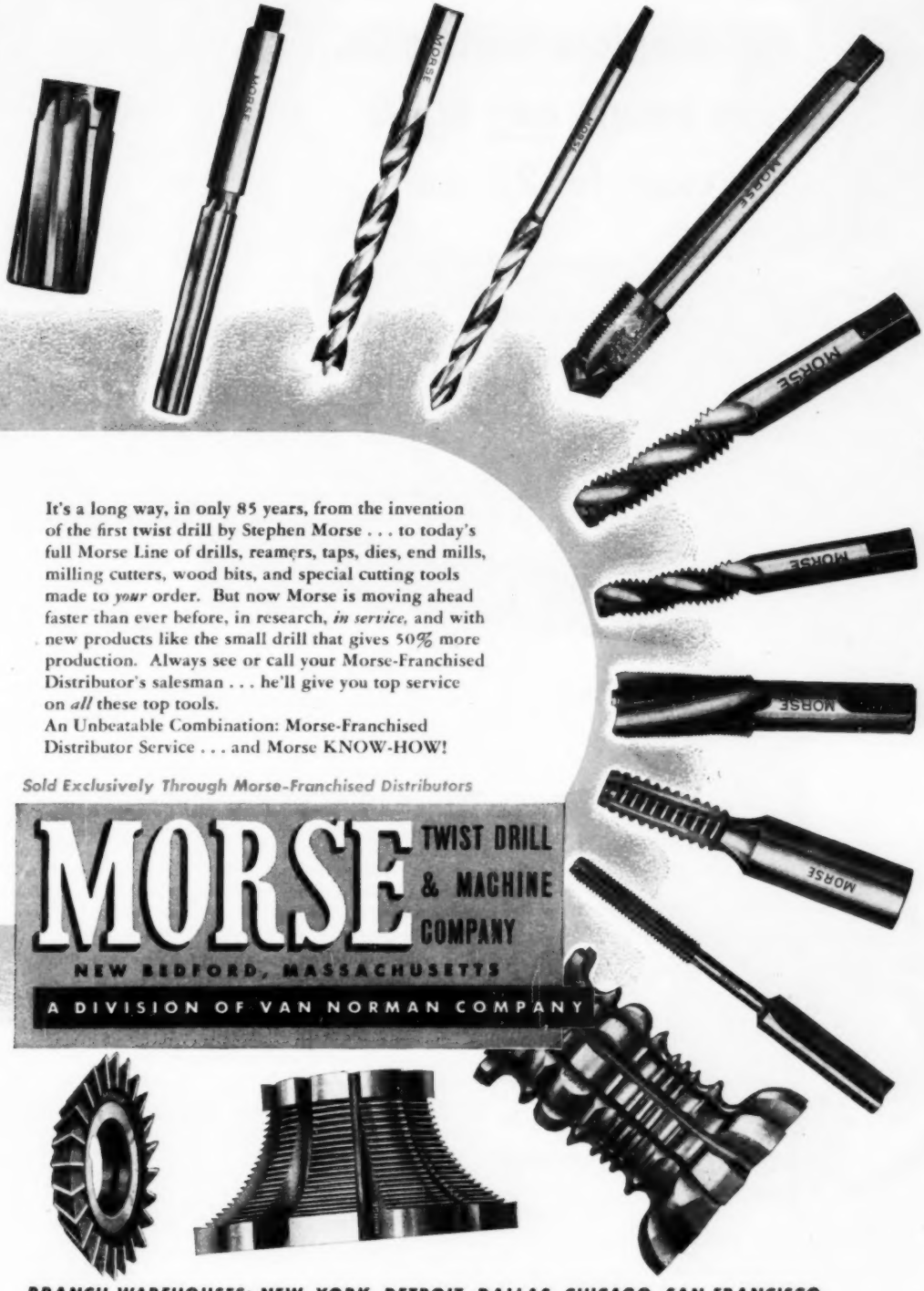
Bulletin No. 327 describes this and other exclusive "Hole Wizard" features of proven value. Want one?

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio, U. S. A.

LATHES AND RADIAL DRILLS

YOUR
MORSE-FRANCHISED
DISTRIBUTOR
Can Supply All your
Tool Requirements—



It's a long way, in only 85 years, from the invention of the first twist drill by Stephen Morse . . . to today's full Morse Line of drills, reamers, taps, dies, end mills, milling cutters, wood bits, and special cutting tools made to *your* order. But now Morse is moving ahead faster than ever before, in research, *in service*, and with new products like the small drill that gives 50% more production. Always see or call your Morse-Franchised Distributor's salesman . . . he'll give you top service on *all* these top tools.

An Unbeatable Combination: Morse-Franchised Distributor Service . . . and Morse KNOW-HOW!

Sold Exclusively Through Morse-Franchised Distributors

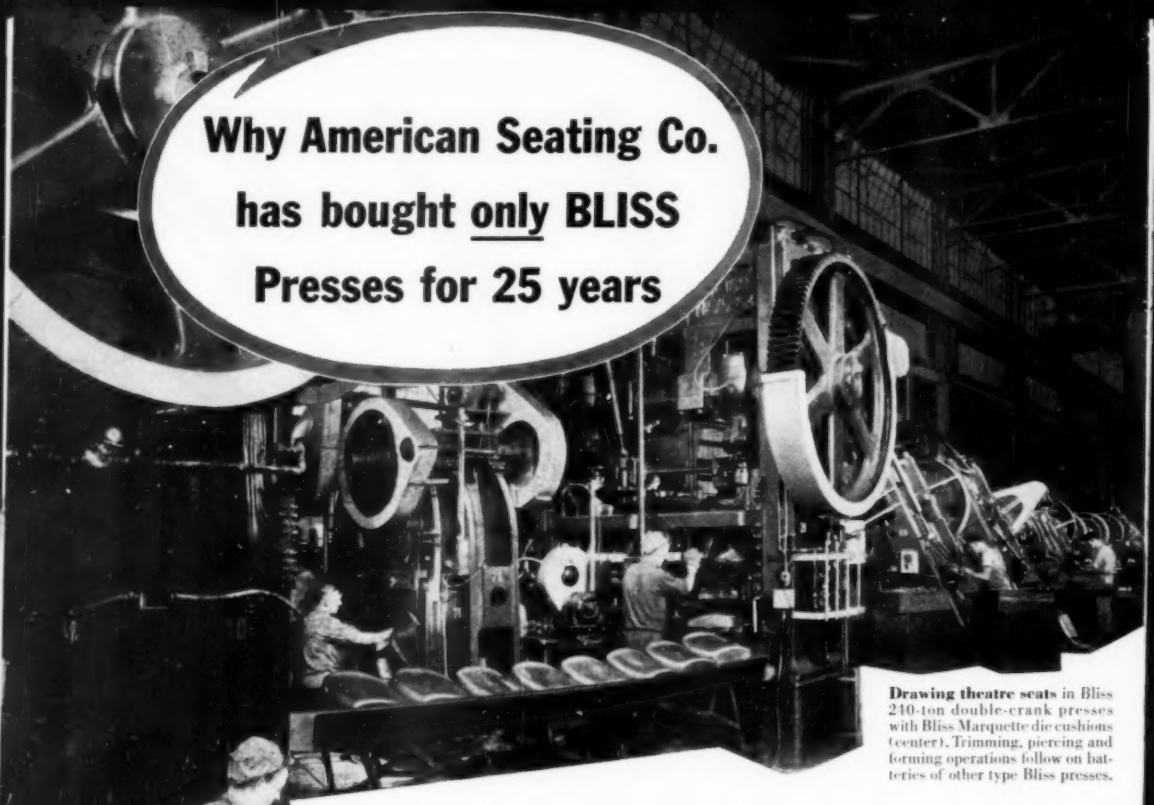
MORSE TWIST DRILL & MACHINE COMPANY

NEW BEDFORD, MASSACHUSETTS

A DIVISION OF VAN NORMAN COMPANY

BRANCH WAREHOUSES: NEW YORK, DETROIT, DALLAS, CHICAGO, SAN FRANCISCO

Why American Seating Co. has bought only BLISS Presses for 25 years



Drawing theatre seats in Bliss 240-ton double-crank presses with Bliss Marquette die cushions (center). Trimming, piercing and forming operations follow on batteries of other type Bliss presses.

Bodiform theatre seats consist of a variety of different stampings, all produced on Bliss equipment.

"Until 1924, we used many makes of presses, but since that year we have purchased only Bliss for our metal plant."

That's how the works engineer of the American Seating Company of Grand Rapids, Michigan, world's largest manufacturer of public seating, tells the story. Today this plant is 75% Bliss-equipped—63 Bliss-built presses in all, including inclinables, horn presses, arch presses, end-wheel, and straight-side single- and double-crank presses.

"What do we like most about Bliss? Well, I'd say it was that extra margin of dependability—and that includes more than press performance," adds the works engineer, who is responsible for the purchase and operation of all of American Seating's metal-working equipment.

Here's what he means by "more than press performance":

1. Engineering counsel on equipment for new stampings.

2. Prompt assistance on presses "down" for repair.

3. Instruction of press-room personnel.

A Bliss sales engineer will tell you of many similar case histories and help you get the most out of your pressed-metal production. Send for him today. See our Catalogue in SWEETS—or send for Bulletin 35-B.

E. W. BLISS COMPANY, TOLEDO 7, OHIO

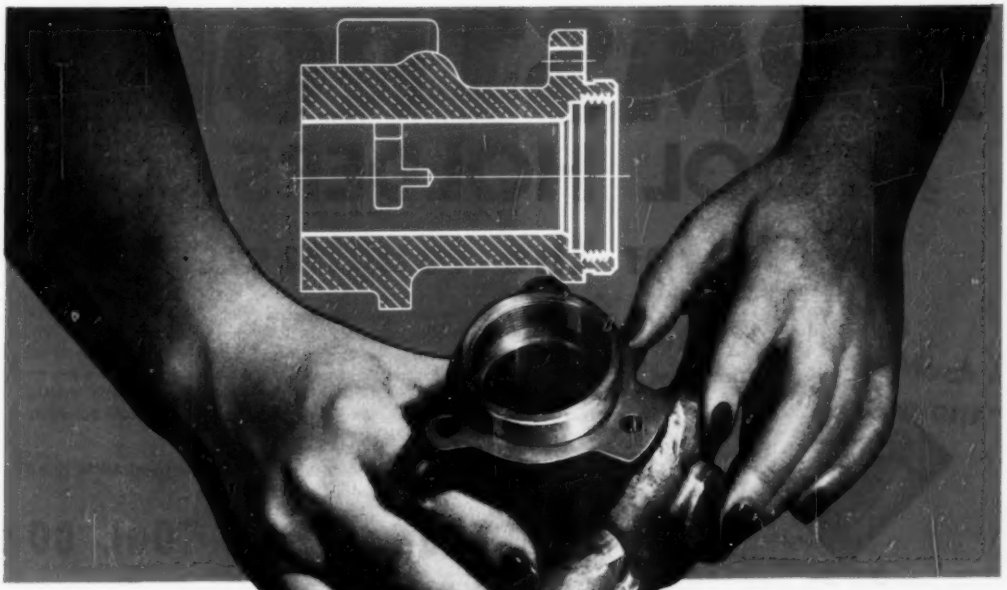
Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery

WORKS AT: Toledo, Salem, Ohio; Hastings, Mich.; Derby, England; St. Ouen sur Seine, France. SALES OFFICES AT: Detroit, Mich.; Rochester, N. Y.; Cleveland, Toledo, Salem, Ohio; Philadelphia, Pittsburgh, Pa.; Chicago, Ill.; New Haven, Conn.; Windsor, Ont.

BLISS BUILDS MORE TYPES AND SIZES OF PRESSES THAN ANY OTHER COMPANY IN THE WORLD

MARQUETTE · BLISS · CUSHIONS · TOLEDO · OHIO

BLISS BUILT



This IS THE RESULT OF P&J PRECISION TOOLING

—a pump housing, just as it comes from the P&J Automatic. Heavy lines in the drawing indicate the 17 exacting operations completed in record time with tungsten carbide P&J-engineered Tooling . . . boring, turning, facing, chamfering, reaming, threading . . . and a clever P&J multiple drill head setup for the three holes in the flanges.

The machine? It's the P&J 3U Speed Flex — smallest of the line of P&J Automatic Turret Lathes — which takes very little floorspace . . . operates with 48 changes of speed from 72 to 1420 rpm for the class of work up to 6″ diameter . . . and features fully automatic operation to take fullest advantage of ingenious P&J Tooling.

Even if your work is beyond the 6″ class, the skill and know-how of P&J Tooling specialists can work out a profitable tooling setup. Send us a sample part or prints, regardless of size, to prove how P&J Tooling will produce more quality parts with fewer rejects, at lower cost.

If your quantity production is within the 6" class, you will want this Bulletin on the P&J 3U Speed Flex Automatic. Just write for it on your Company letterhead.

PRODUCTION TOOLING HEADQUARTERS

Potter & Johnston Company

Pawtucket, R. I.

subsidiary of Pratt & Whitney

Division Niles-Bement-Pond Company

ARMSTRONG
TOOL HOLDERS...
for the toughest steels!

The "Armstrong System" provides special ARMSTRONG TOOL HOLDERS for ARMALOY (cast alloy) and for ARMIDE (carbide-tipped) cutters. With these modern cutting tools, the toughest and hardest steels are easily machined. Far heavier feeds and the extremely high cutting speeds become practical (300 f.p.m. with ARMALOY cutters; 600 f.p.m. with ARMIDE cutters). Delays for tool re-grinding are reduced to an absolute minimum—edges hold up to 100 times as long.

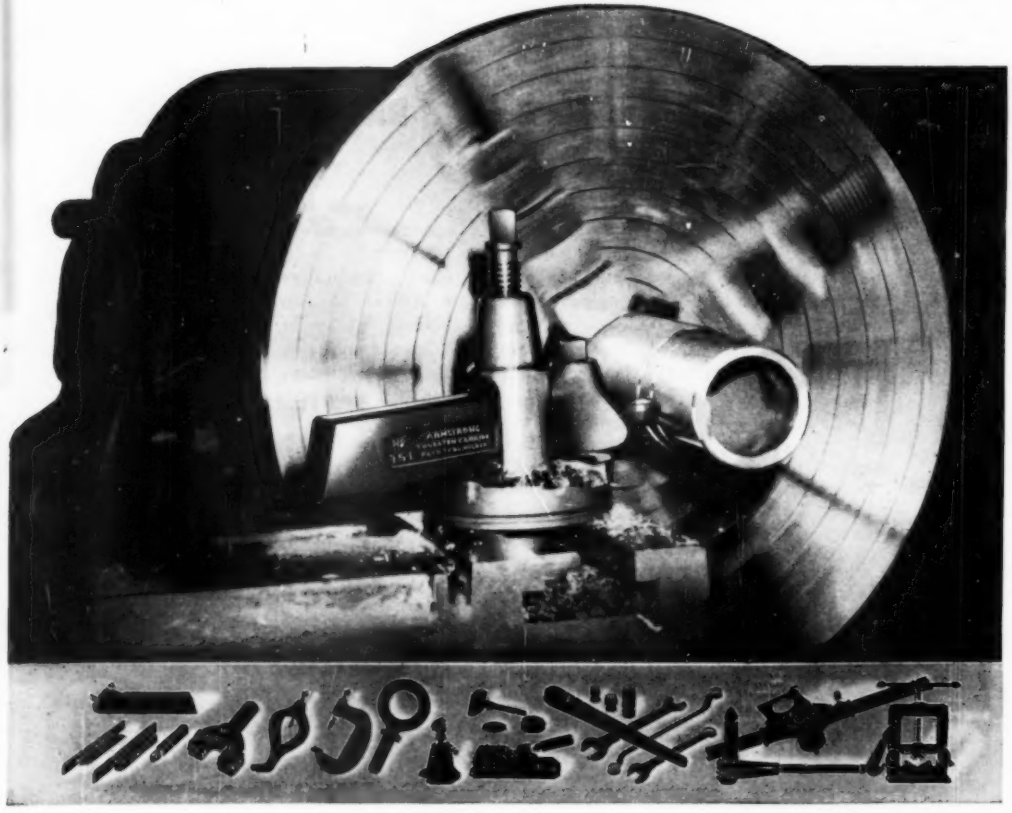
These new tool holders and cutters are stocked by your Local ARMSTRONG industrial distributors.

WRITE FOR CATALOG

ARMSTRONG BROS. TOOL CO.

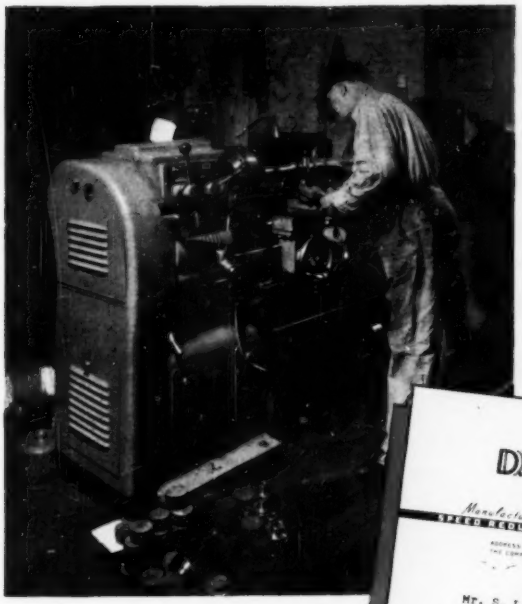
"The Tool Holder People"

5215 West Armstrong Ave. Chicago 30, U.S.A.



Sebastian
GEARED HEAD LATHES
by KING

. . . "For Many Jobs Formerly Done On Much More Expensive Equipment"



New 16" Sebastian Lathe recently installed at the D. O. James Gear Mfg. Co., Chicago. Sebastian Geared-Head General Purpose Lathes are also made in 12" and 20" sizes.

D. O. JAMES
Manufacturers of Gear Manufacturing Co.
SPEED REDUCING TRANSMISSIONS, CUT GEARS, TURNBULL EQUIPMENT

1400 W. MONROE STREET
CHICAGO 7, ILL. U.S.A.
TELEPHONE CANAL 6-1800

January 27, 1949.

Mr. S. L. Beckwith, Sales Manager
American Steel Foundries
Tennessee Avenue & Paddock Road.,
Cincinnati 29, Ohio

Dear Mr. Beckwith:

We appreciate your interest, following the delivery of our new Sebastian Lathe, in frankly asking us what we think of this lathe.

We have many lathes in operation and have always considered that we must have nothing but the heavy duty type lathe as a matter of policy.

Since the delivery and installation of our new 16" x 6' Sebastian, we have found that so many jobs can be done on it that we find ourselves thinking in terms of this lathe for many jobs formerly done on much heavier and much more expensive equipment.

For facing shoulders on hubs, turning a face angle or back angle we find this Sebastian lathe more than adequate and because of its sturdy construction it is capable of much work up to its rated capacity.

We are giving serious consideration to additional installations because of the satisfactory operation of this first one.

Very truly yours,

D. O. JAMES GEAR MFG. COMPANY

BY John B. Lukey

John B. Lukey,
General Superintendent.

JBL:SS

Like the D. O. James Gear Manufacturing Company and other prominent, cost-alert manufacturers, you will get the accuracy, versatility, and dependable performance of *larger, more expensive lathes* when you specify the medium-priced "King-made" Sebastian.

With 8 speed steel-geared head . . . Timken Tapered Bearings on all headstock shafts . . . Reverse in apron for feeds . . . 57 feed and thread changes . . . and many other outstanding features . . . the modern Sebastian definitely offers *more lathe for your money.*

See your nearest Sebastian Dealer. Ask him or write us for Catalog S-1 (Standard Lathes) and S-101 (Special Type Lathes — Gap, Clutch and Brake, etc.)

Dealers in Principal Industrial Centers

American Steel Foundries

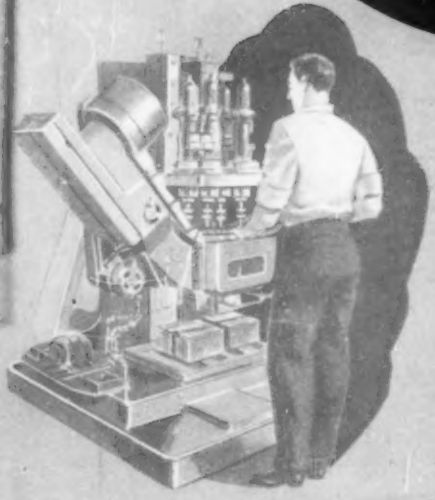
KING MACHINE TOOL DIVISION

CINCINNATI 29, OHIO

Builders of King Vertical Boring & Turning Machines and Sebastian Lathes

WINTER

TAPS IN ACTION



ALWAYS AT YOUR SERVICE

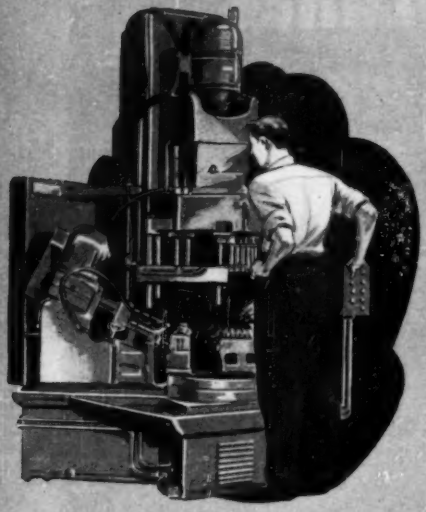
YOUR LOCAL DISTRIBUTOR carries a complete stock of WINTER Taps on his shelves—as close to your tapping problems as it's telephone on your desk.

WINTER STRAIGHT SHANK TAPPER TAPS are recommended for fast, clean, high quantity production in nut tapping machines. They are furnished with plain round shanks at regular prices, and are also available with squared end, Acme Type "C", or National Interchangeable Ring Lock shanks at additional cost. In carbon steel, they are stocked in fractional sizes from ¼" diameter to 1½" diameter, and in machine screw sizes from Screw Gauge No. 4 to No. 12—all with cut thread only. In high speed steel, they are stocked in fractional sizes only, from ¼" diameter to 1" diameter, with choice of cut thread or commercial ground thread. Winter also manufactures bent shank tapper taps, and a complete line of other taps, including hand, chip driver, machine screw, nut, pipe, pulley, and stove bolt taps, as well as a full selection of dies.

WINTER BROTHERS COMPANY • Division of the National Twist Drill and Tool Company
Rochester, Michigan, U.S.A. Distributors in Principal Cities • Branches in New York, Detroit, Chicago, San Francisco

NATIONAL METAL CUTTING TOOLS

ON THE JOB



NATIONAL INTERCHANGEABLE COUNTERBORES are rugged, efficient, and adaptable. The simplicity of design of the spline-taper drive is one of its best recommendations. Taper shank and socket for alignment and rigidity; spline keys for jam-proof and twist-proof performance—that is all there is to it. Equal ruggedness, positive driving, and accurate alignment are obtained in the spline drive of **NATIONAL INVERTED SPOTFACERS.** Pilots fit snugly in the cutter; driving is accomplished through splines that are part of the pilot, bearing against slots in the cutter. The cutter is retained by solid shoulders on the pilot, yet removal is easy. National also makes solid counterbores, and a full line of standard and special rotary metal cutting tools, including twist drills, reamers, milling cutters, end mills, hobs, and special tools.

NATIONAL TWIST DRILL & TOOL ROCHESTER, MICH. U.S.A.

National

CALL YOUR DISTRIBUTOR

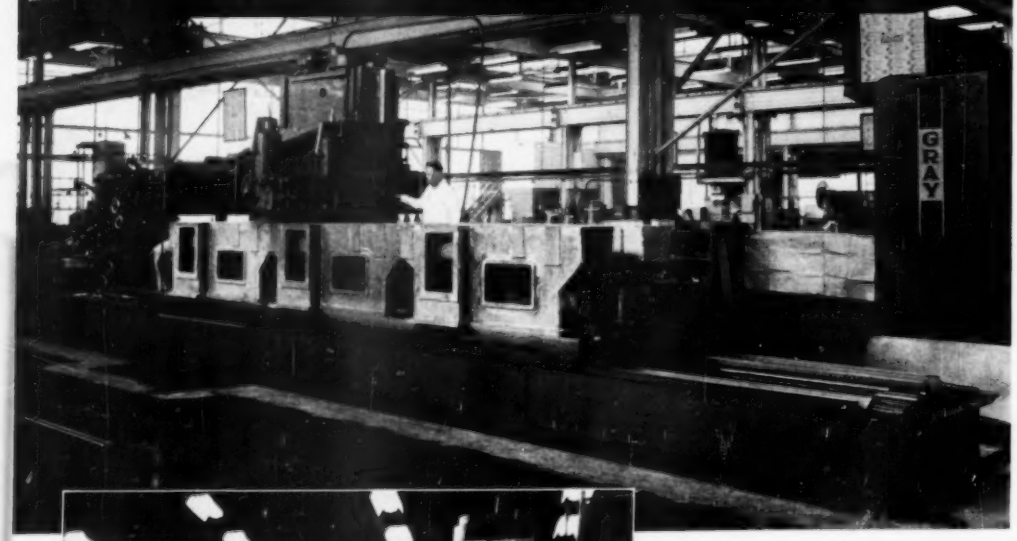
LEADING DISTRIBUTORS EVERYWHERE offer complete stocks of NATIONAL metal cutting tools. Call them for cutting tools or any other stock industrial product.

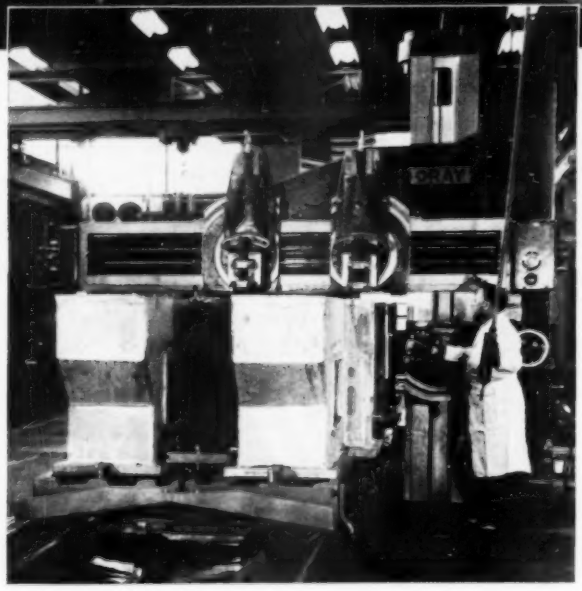
NATIONAL TWIST DRILL AND TOOL COMPANY • Rochester, Michigan, U.S.A.

Distributors in Principal Cities • Factory Branches: New York • Chicago • Detroit • Cleveland • San Francisco

PUT THE "Prod" IN YOUR Production

with a new GRAY PLANER





The versatility and rigidity of the new GRAY OPENSIDE PLANER makes it a production favorite. GRAY speed and power will cut your production costs.

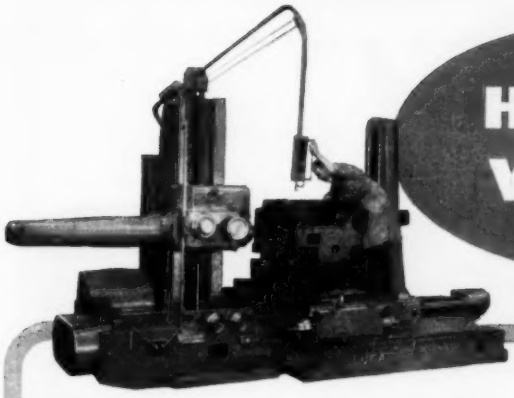
•

66" x 60" x 20' Gray Convertible Openside at the SNYDER TOOL & ENGINEERING CO., Detroit, Michigan. Gang planing fabricated steel parts for special automotive machinery.

The G.A. GRAY Company

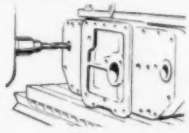
planers • milling planers
planer type milling machines
horizontal boring machines

CINCINNATI 7, OHIO, U. S. A.
SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES

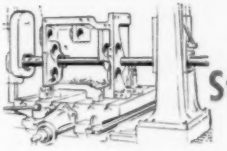


HERE'S LUCAS VERSATILITY

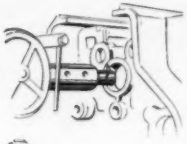
Accurately spaced drilling and boring . . .



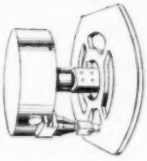
Line boring . . .



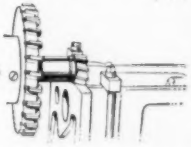
Stub boring . . .



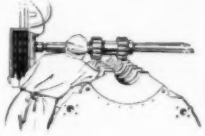
Facing . .



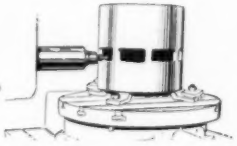
Face and end milling . . .



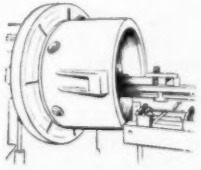
Milling with arbor . . .



Milling with power rotary table . . .



Turning . .



. . . just part of a day's work for a Lucas horizontal boring, drilling and milling machine . . . the precision "one man machine shop." Not just a highly accurate tool room machine, but big and rugged for production work too. So versatile and adaptable, it is rarely idle in any shop.

Mechanically controlled 3" and 4" spindle models. Also 4", 5", and 6" spindles with remote all-direction electrical controls. Work ranges are from 36" x 36" to 94" x 84". All sizes available with either two-way or four-way beds, and feature high and low speed ranges to a single spindle. *Available with automatic power positioning dial indicators for repetitive, close tolerance work.*

Write for descriptive literature.

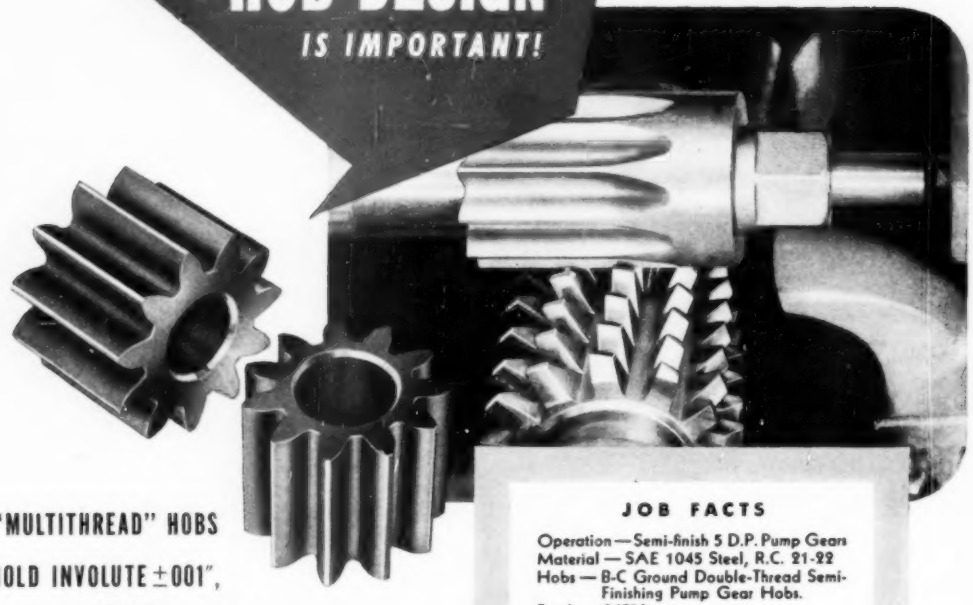
LUCAS OF CLEVELAND

LUCAS

Precision

HORIZONTAL BORING, DRILLING AND MILLING MACHINES
LUCAS MACHINE DIVISION, THE NEW BRITAIN MACHINE CO.
CLEVELAND 8, OHIO

Good HOB DESIGN IS IMPORTANT!



"MULTITHREAD" HOBS HOLD INVOLUTE ±.001", PRODUCE **20** GEARS PER HOUR.

JOB FACTS

Operation — Semi-finish 5 D.P. Pump Gears
Material — SAE 1045 Steel, R.C. 21-22
Hobs — B-C Ground Double-Thread Semi-Finishing Pump Gear Hobs.
Feed — .045"/rev.
Speed — 160 RPM
Production — 20 gears per hour
Accuracy — Involute ± .001"
Hob Life — 120 pieces per sharp.

Take these pump gears, for example. Their efficiency depends upon how *accurately* they can be produced; their cost on how *fast* they can be produced.

Accuracy, of course, depends on machine conditions too, but it is difficult to produce tolerances in the work which are not present in the tool itself. Nor can quality gears be hobbed at a fast rate if the tool isn't built and designed to take the pace.

The basis of satisfactory gear production is *good hob design.* It saves money, grief and tool life, while guaranteeing the quality of work desired.

Send your hobbing problems to Barber-Colman engineers for recommendations. The importance of Good Hob Design will soon be evident in production gains.

TYPICAL DESIGNS

Get your copy of Hobbing Data containing production results on a variety of Hob Designs. Ask for File No. 3127.

Barber-Colman Company

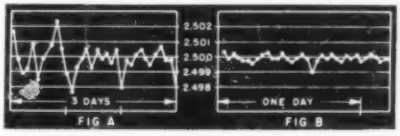
GENERAL OFFICES AND PLANT, 3127 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.

What's in VERMONT *this month?*

HOW OPERATION CONTROL SAVES MONEY ON PRODUCTION THREADING It took but three weeks to locate and correct the cause of production faults shown in figure A. Installation of Bryant thread and squareness-of-face Gages resulted in acceptability of all parts and production was increased as shown in figure B.

These unique gages give a visual quantitative reading of accuracy within tolerances or accumulated inaccuracies of lead, pitch diameter and thread form, or the presence of burrs. The squareness-of-face attachment shows relationship of face to pitch diameter.

Operation Control (1) catches mistakes as they are made; (2) places responsibility fairly on operator, tools or machine; (3) provides a statistical record of regularly sampled parts showing the status and trend of the operation at all times.



Bryant Thread Gages used in the analysis shown above proved that a sizable investment in new machines was unnecessary, and, most important, improved the accuracy and production of these internally threaded parts.

Some of the Bryant Gages are illustrated on the following page.

Bryant Chucking Grinder Co. • Springfield, Vermont, U.S.A.

BRYANT *Thread Gages*

3-Flute Tap Gage

Bryant thread gages, a few of which are shown, are built in many standard and special models to handle the inspection on a wide range of threaded parts. Segments for both external and internal gages are furnished to either GO or NOT GO thread form to "W" tolerances, thus accommodating all classes of fits. Capacities of standard bench models are $\frac{3}{8}$" to 5" internal and $\frac{3}{16}$" to 5" external; portable models are $\frac{7}{16}$" to 3" internal. Write the factory for full information.

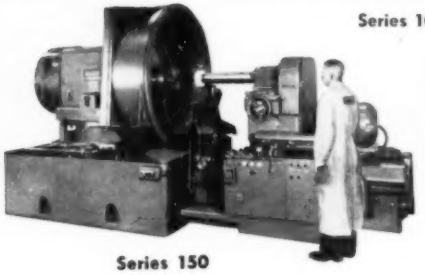
No. 1 External Thread Gage

Internal Portable Thread Gage

No. 1 Thread Gage with Squareness-of-Face Gage Attached

No. 2 External Adjustable Thread Gage

BRYANT INTERNAL GRINDERS



Series 150

Series 109

For 38 years Bryant has manufactured precision internal grinders. Today, the complete line covers machines for grinding holes from .040" to 50" in diameter. Standard and special machines will grind straight, tapered, curved and irregular holes, or any of these in combination. Face and hole grinding can be combined to assure squareness. Cams and irregular holes can be ground by using the Bryant cam tooling. Write to the factory for full details.

Bryant Chucking Grinder Co. • Springfield, Vermont, U.S.A.

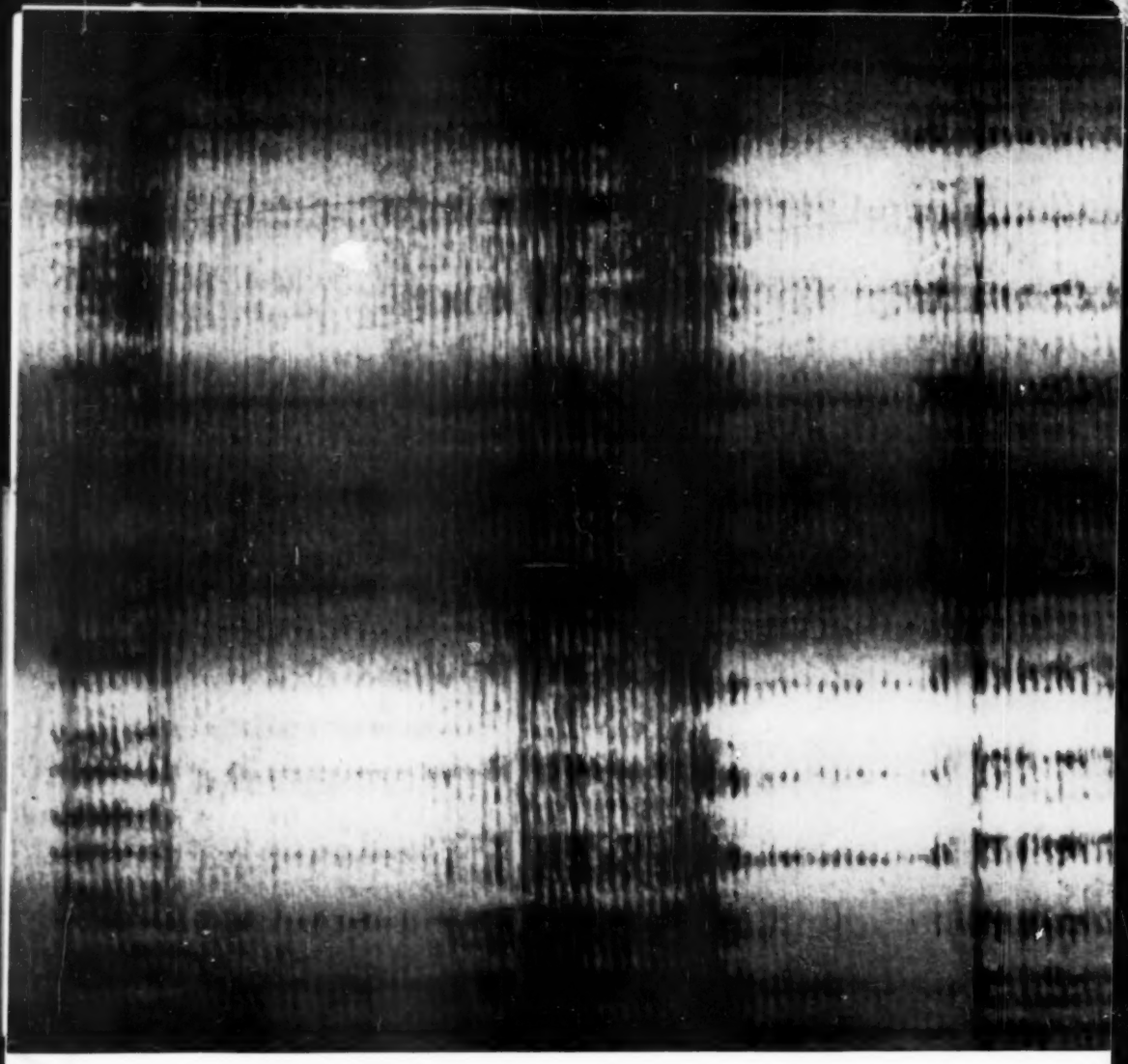
50th birthday of the company whose products you know by the trade-mark: TIMKEN

SINCE 1899 THE TIMKEN ROLLER BEARING COMPANY HAS BEEN HELPING AMERICAN INDUSTRY GET THE MOST FOR ITS MONEY

NOBODY likes to buy a "pig in a poke". In America you don't have to. You're protected by trade-marks like "TIMKEN".

Registered as a trade-mark in the United States Patent Office, "TIMKEN" identifies products made by The Timken Roller Bearing Company: Timken tapered roller bearings, Timken alloy steels and seamless tubing and Timken removable rock bits.

Experience over the years has shown Timken products to be the finest in their respective fields. And many thousands of men and women are working hard to keep them that way. No wonder it has become a habit throughout industry to look for the trade-mark "TIMKEN". The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO"



Do your bearings just *"hit the High Spots"?*

● You can't avoid this sort of thing without Superfinishing. This steel shaft, finely ground to 14 micro inches, shows typical "high spots" after the break-in period. These black areas, amounting to about 35% of the total bearing surface, carry the entire load. Thus, it's not a full bearing.

Had this part been Superfinished, the cylindrical form would be geometrically improved. The area contact of the Superfinishing stone would remove the sharp peaks, ridges, feed and chatter marks, "smear metal" and other irregularities. The result would be a more uniform bearing surface which would last infinitely longer.

This is but one of many interesting phases of Superfinishing explained in the new textbook, "Wear and Surface Finish." Please use your company letterhead when requesting it.

GISHOLT
MACHINE COMPANY
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE
represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES • AUTOMATIC LATHES • SUPERFINISHERS • BALANCERS • SPECIAL MACHINES

Varies Speed *WITHOUT STOPPING*

Another *Texrope* Engineering Triumph!

- Instant speed control at lower cost than ever before
- Covers most speed changing needs from 3 to 20 hp
- Extremely simple — one sheave does all
- Infinitely variable speed — 200% range

SIMPLEST, most economical method of instant speed control ever devised. Simply move motor forward to increase speed and move it back to decrease. The new *Vari-Pitch* Automatic Sheave changes pitch diameter and holds belts at proper tension automatically. All other parts of the drive are standard *Texrope* V-belt drive components.

For details see your A-C Authorized Dealer or Sales Office or write for bulletin 20B7223. *Texrope* and *Vari-Pitch* are Allis-Chalmers trademarks.

A-2709

Sold . . .
Applied . . .
Serviced . . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

PUMPS — Integral motor and coupled types. Sizes and ratings to 2500 GPM.

ALLIS-CHALMERS, 999A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

NOW... Eliminate guesswork in lathe calculations....

...with this EXCLUSIVE CALCULATOR—on all Lodge & Shipley Model "X" Lathes

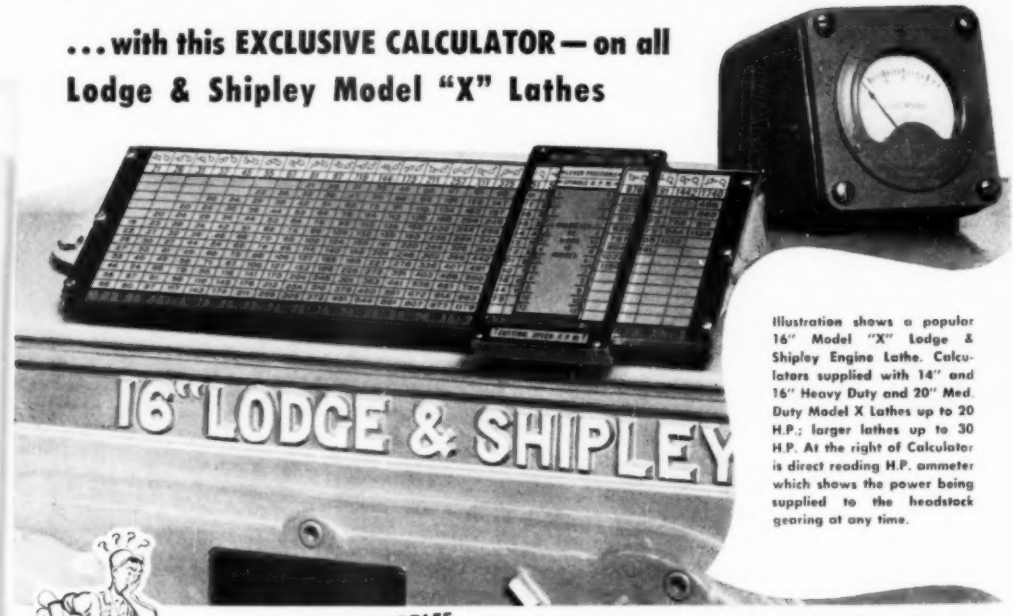


Illustration shows a popular 16" Model "X" Lodge & Shipley Engine Lathe. Calculators supplied with 14" and 16" Heavy Duty and 20" Med. Duty Model X Lathes up to 20 H.P.; larger lathes up to 30 H.P. At the right of Calculator is direct reading H.P. ammeter which shows the power being supplied to the headstock gearing at any time.

BANISHES MENTAL MUDDLES . . .

SLIPSTICK STRUGGLES . . .

PENCIL PUZZLIN' . . .

ANOTHER exclusive feature to save time, increase efficiency is introduced by Lodge & Shipley. Now you merely set the feet-per-minute cutting speed on the Calculator against the largest diameter of the workpiece and read off the proper R.P.M. and correct lever settings. The maximum H.P. for this speed also appears at the bottom of the Calculator.

There are no mental gymnastics on the part of the operator, no waiting for a set-up man, no errors . . . the calculating operation is quick and entirely mechanical.

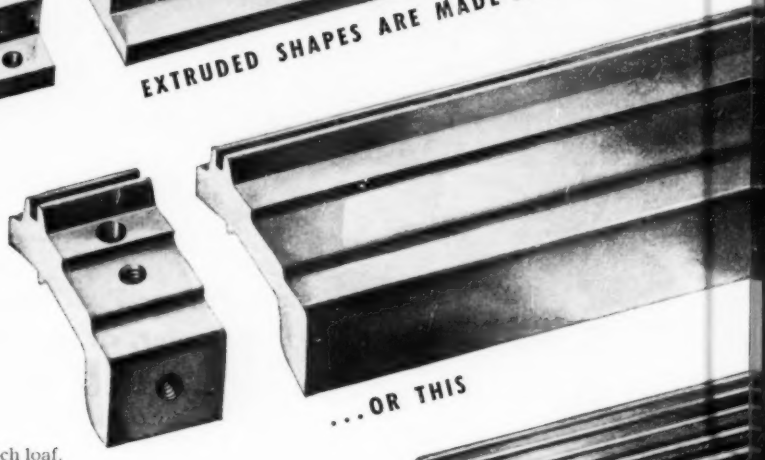
The direct reading H.P. ammeter (optional at extra cost) indicates the H.P. being supplied to the headstock at any time or condition of cut. Machine and motor are protected against overloading. In the high speed range, the L & S headstock will transmit maximum H.P. for about 80% of that range.

With this exclusive Lodge & Shipley feature, even unskilled operators can sustain maximum productivity . . . feel confident in changing speeds so easily determined . . . perform *more work* at the *most economical speed.* Thus the newly-introduced Lodge & Shipley "X" Lathes, already setting new standards for production and profit, reach even greater efficiency. Your Lodge & Shipley Representative will gladly furnish complete details.

THE **Lodge & Shipley** COMPANY

MACHINE TOOL DIVISION • 3055 COLERAIN
SPECIAL PRODUCTS DIVISION • 800 EVANS ST.
CINCINNATI 25, OHIO

Another* Lodge & Shipley *Profit Feature!



THE OBJECT
to SAVE TIME— REDUCE WASTE

There's very little waste on a sandwich loaf. That's because it was especially designed for its particular job.

And that's the way it is with Anaconda Extruded Shapes. Almost-finished blanks are literally "sliced" off long, mill-length bars that are made as close as possible to the cross-section of the finished product. Doing it this way, you just can't help saving metal, money and machining.

You're likely to find (as hundreds of other manufacturers have) that quality goes up while costs come down when you switch to Extruded Shapes, because extruded metal is *wrought* metal . . . readily machinable, strong, tough, dense-grained and smooth-surfaced. We'll be glad to make suggestions on receipt of a sketch or sample.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ontario

ANACONDA
from mine to consumer

Anaconda

EXTRUDED SHAPES

COPPER · BRASS · BRONZE AND SPECIAL COPPER ALLOYS

August Ries, foreman of Victor Electric's rotor production, shown removing a "gate" of four rotors from the Model 400 Cleveland.

Here's how to get relief from hot competition!

Victor Electric Products Inc. builds a *better* motor, *faster*, at *less cost*, with the help of CLEVELAND Die Casting Machines...

The rotors shown being cast above are used in 1/20 h.p. induction motors that power this 3-speed, 16" "Victron" Heavy Duty Oscillating Fan—one of the many fine electric ventilating, heating and appliance products designed and built by Victor Electric Products Inc. One of the "as-cast" rotors is shown below.

By *die casting* rotors for fractional h.p. motors on Cleveland Die Casting Machines, Victor Electric Products Inc., Cincinnati, have by-passed many costly steps in their motor fabricating line; have increased production more than 300%; are able to maintain the *uniform excellence* of product construction that is Victor Electric's stock-in-trade.

With their two Model 400 Clevelands, Victor Electric makes rotor production a *breeze*. Stamped rotor laminations are weighed, stacked, pressed on splined shafts and inserted in a four-cavity die in the Cleveland machine. 99.5% pure aluminum is injected into the die and through the lamination perforations to form the rotor conductor bars and end rings.

Production averages 55 perfect shots per hour. *Only* 25% of the total output require corrective drilling to be in dynamic balance! The Cleveland-cast rotor is high in conductivity; has minimum porosity; is indestructible in operation. Considerable time is saved; metal and labor costs are way down; a *better* product results.

Are *you* considering new die casting machinery—or *changing* to die casting? If so, why don't you profit from the experience of many manufacturers and consider Clevelands *first?* For machine specifications, write now for bulletins.

THE CLEVELAND AUTOMATIC MACHINE COMPANY

4928 Beech Street
Cincinnati 12, Ohio

SALES OFFICES: CHICAGO
CLEVELAND • DETROIT
HARTFORD • NEWARK

Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Casting Machines

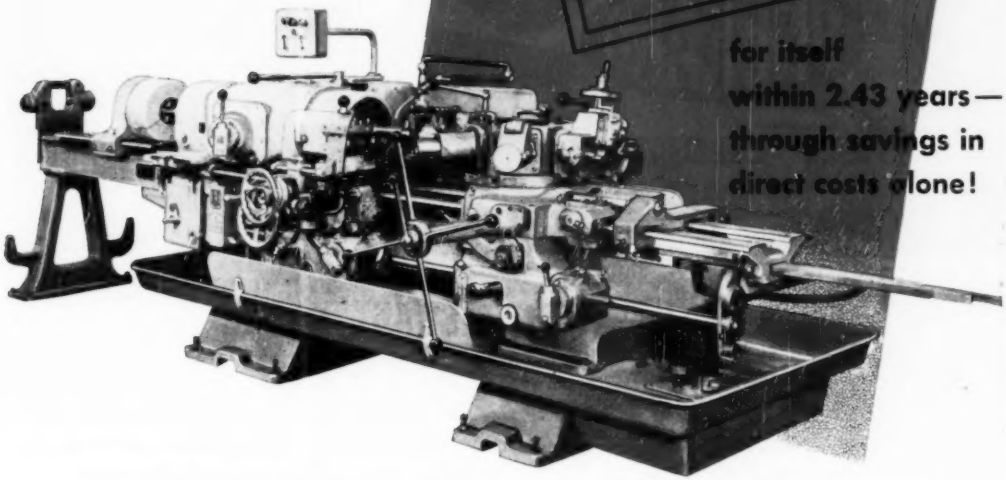
41% DIVIDEND

THE FIRST YEAR*

This Jones & Lamson Turret Lathe will have

PAID

for itself within 2.43 years—through savings in direct costs alone!



*Any investment which produces a 41% dividend the first year is worth looking into! The savings which produced this dividend were revealed by our analysis of a manufacturer's actual turning operations.

Even if your present machines are less than 10 years old, the purchase of a new Jones & Lamson Turret Lathe may be justified through *savings in direct costs alone!*

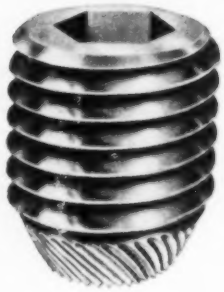
Let us determine what *YOUR* savings might be—what dividend *YOU* would receive each year from the purchase of a new Jones & Lamson Turret Lathe.

Write to Dept. 710-I for this FREE SERVICE.

Turret Lathe Division

J&L JONES & LAMSON MACHINE COMPANY
Springfield, Vermont, U.S.A.

MACHINE TOOL CRAFTSMEN SINCE 1835



The patented Knurled Cup Point of this popular "UNBRAKO" Socket Set Screw makes it a Self-Locker, because the edges of the counter-clockwise knurls positively prevent creep, regardless of the most chattering vibration. *"It won't shake loose!"*

Pat. & Pats. Pend.

The patented Knurled Threads of this "UNBRAKO" Socket Set Screw are swaged—making it a most excellent Self-Locker for applications requiring cone, oval, flat or other points except cup, and for use with hardened shafts. *"It won't shake loose!"**

Pat.

UNBRAKO

SELF-LOCKING SET SCREWS

"...THEY WON'T SHAKE LOOSE"

Machine failure from any cause is expensive—in downtime, repair costs, lowered production, poor deliveries and loss of customer goodwil!. Frequently such failure is caused by the loosening of set screws holding vital machine parts together.

UNBRAKO *Self-Locking* Set Screws won't shake loose! Their exclusive *knurling* makes them exceptionally vibration-resistant, prevents "creep" and subsequent loosening of the screws. They "stay put", even under the most chattering vibration.

UNBRAKO *Self-Locking* Set Screws can be real "Vibration Insurance" for *your* production machinery. And remember, they make an impressive selling point when you use them on your finished products.

Our folder 658-1 gives you further details. Write for yours today!

Knurling of Socket Screws originated with "Unbrako" in 1934.

*These screws are not carried in stock. Prices are available on application.

SPS STANDARD PRESSED STEEL CO.

BOX 4, JENKINTOWN, PENNSYLVANIA

"Serving Industry continuously since 1903 through Industrial Distributors"

for HIGH PRODUCTION BROACHING see *American*

Transmission Maker produces over 600 internally splined hubs every hour with AMERICAN Automatic Broaching Machine.

Full automatic operation which keeps pace with automotive mass production schedules is economical and practical with American engineered broaching machines. Take, for example, the problem of this transmission manufacturer. The part was a steel forged hub blank, which required broaching of an internal diameter and six splines. The production rate specified was high.

American engineers recommended a VP-4-25-36 vertical internal pull up broaching machine arranged with four (4) broaching stations, manually loaded feed unit with hydraulically operated work slide for traversing the parts from the magazine to broaching position.

The slide carries four parts from the loaded magazines to broaching position and lower cylinder automatically starts on up stroke. Broaches are carried through the part to the pull heads, and the first broaching teeth carry up the part and locate it against the work bushings as the broaching stroke starts automatically. At the end of the stroke the parts drop and are automatically deflected to the front of machine, the broaches return to the lower position, and four new blanks are positioned by the slide for the next stroke. The operator need only keep the magazines loaded. The unit was supplied with a motor driven chip conveyor.

Perhaps a semi or fully automatic American type VP broaching machine is the answer to your production problems. They are built in several sizes and tonnages to suit a wide range of internal broaching operations. For more complete information write for new Circular 400. Address Dept. A.

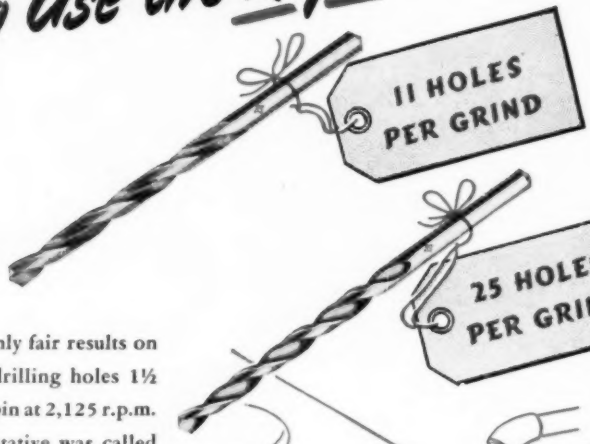
AMERICAN *American* BROACH & MACHINE CO.

A DIVISION OF SUNDSTRAND MACHINE TOOL CO.

ANN ARBOR, MICHIGAN

See *American* First—for the Best in Broaching Tools, Broaching Machines, Special Machinery

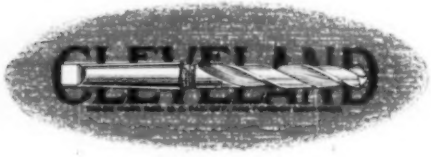
It Pays to Use the Right Drill

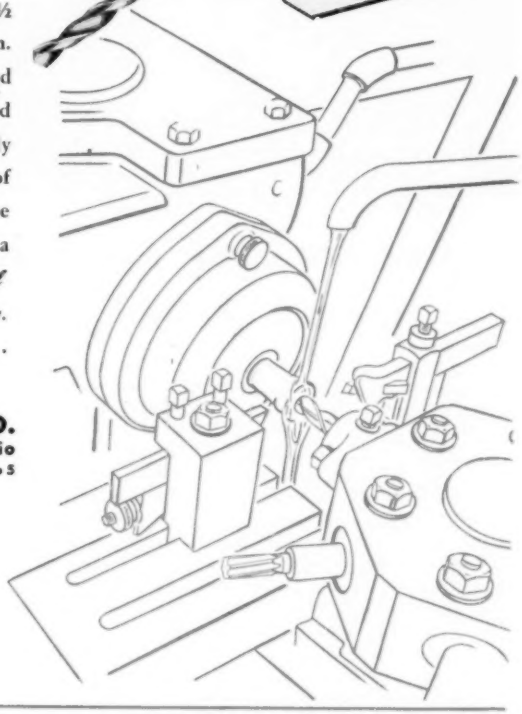


A midwestern plant was getting only fair results on a difficult machining operation—drilling holes 1½ inches deep in a stainless steel link pin at 2,125 r.p.m. ◈ A *Cleveland* Service Representative was called in. He studied the job carefully, and recommended a CLE-FORGE High Speed Drill that was especially designed for this type of work. Result: Number of holes per grind was *more than doubled*. Both were stock drills; both priced the same. But what a difference in performance! ◈ Perhaps a *Cleveland* Service Representative can be equally helpful to *you*. Get in touch with our nearest Stockroom, or . . .

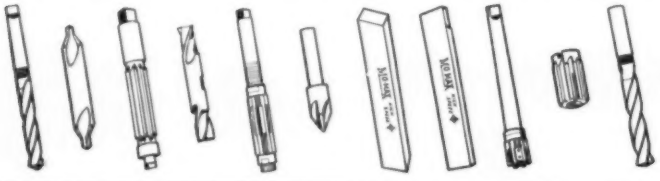
Telephone Your Industrial Supply Distributor.

THE CLEVELAND TWIST DRILL CO.
1242 East 49th Street Cleveland 14, Ohio
Stockrooms: New York 7 • Detroit 2 • Chicago 6 • Dallas 1 • San Francisco 5
Los Angeles 11 • London W. 3, England





ASK YOUR INDUSTRIAL SUPPLY DISTRIBUTOR FOR THESE AND OTHER CLEVELAND TOOLS



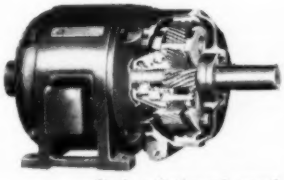
Buy TRI CLAD Gear Motors

REG. U.S. PAT. OFF.

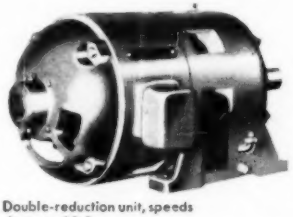
when? . . . . . NOW!

how? . . . FROM STOCK!

9 strategic locations throughout the country assure you of Fast Delivery



Single-reduction unit, speeds down to 155 rpm.



Double-reduction unit, speeds down to 13.5 rpm.

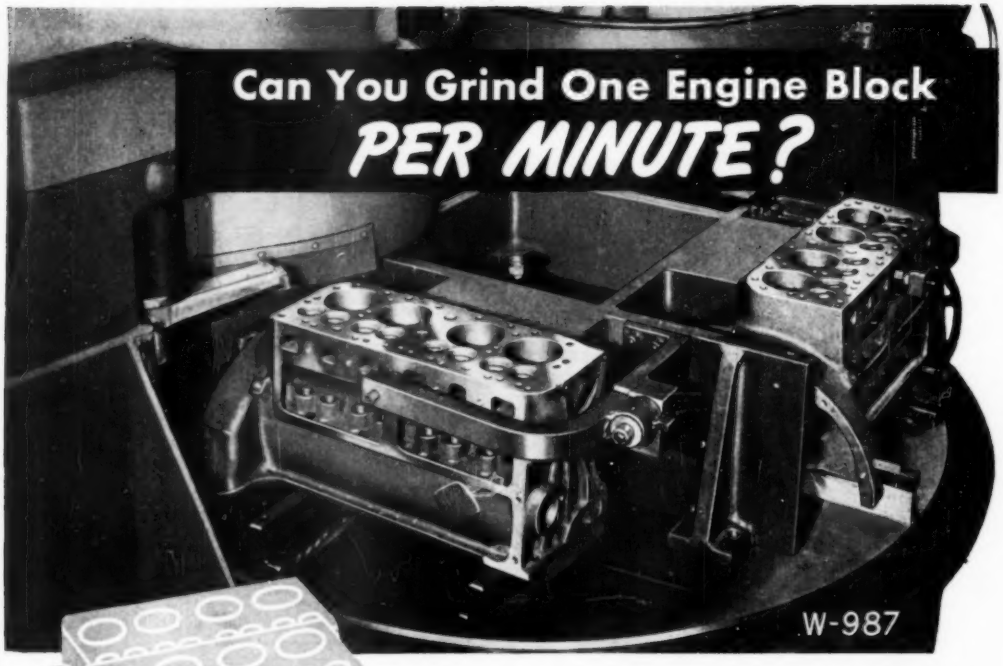
Most popular Tri-Clad gear-motor ratings, from 1 to 15 hp, are available right off warehouse shelves.

Look at what you get—the industry proved Tri-Clad induction motor for low-speed drives. Extra load carrying capacity in a smaller space than conventional gears because General Electric's planetary gear system gives you an additional 1:1 ratio of reduction. You get easier mounting in a smaller space, more motor protection with Tri-Clad gear-motors.

You'll find that standard G-E gear-motors fill the bill for most low-speed drives. Where special requirements must be met, G-E engineers can build you a gear-motor engineered to your specifications.

Call your nearest General Electric sales office—or General Electric Distributor now for FAST SERVICE on all your gear-motor requirements. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC



BLANCHARD 16-A2 GRINDS TRACTOR CYLINDER BLOCKS CONTINUOUSLY

Here is a good example of mass grinding of larger pieces at a greater profit.

A four station mechanical clamping fixture, designed and built by Blanchard, continuously rotating on the 55" diameter chuck of a No. 16-A2 Blanchard Surface Grinder, presents the Engine Blocks to the grinding wheels.

The material is cast iron and .010" of stock is removed from each surface—*to a flatness of .0015".*

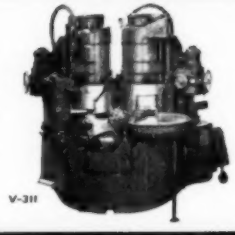
Production is 60 pieces per hour including loading and unloading time.

If you have larger engine cylinder blocks to grind, the Blanchard 22-A, with proper number of spindles, will do the job. Let Blanchard show you how.

PUT IT ON THE BLANCHARD

Whatever type of flat surface machining your parts may require—simple "cleaning up," rough grind and finish grind in one operation, or very flat surfaces with fine finish and held to close limits—there is no more profitable method, in most cases, than to "Put it on the Blanchard."

If you machine flat surfaces . . . bring your problems to Blanchard engineers.



BLANCHARD

The **BLANCHARD** MACHINE COMPANY

64 STATE STREET, CAMBRIDGE 39, MASS., U. S. A.

LOOK AT THIS PRESS

It's designed to provide industry with low-cost, high production units that are highly flexible in design and operation . . . relieving heavier presses of short runs and lighter work. Presses are practically fool-proof in operation. Frame is extremely rugged. Fingertip controls are conveniently located at hand level. Available for immediate delivery, in standard width (between uprights) of 24″—31″—36″—42″ respectively. Available in special width up to 72″ at small additional cost. Movable bed plates. Pumping unit has by-pass relief valve which can be set at any pressure up to press capacity. Presses available for either vertical or horizontal operation. *All Standard* presses equipped with 2-speed built-in hand pumps for more sensitive and versatile operation.

READ THESE "SPECS":

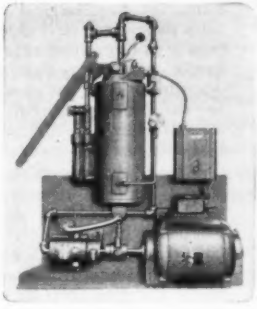
CYLINDERS: *Standard Models* furnished with 6" bore, 7½" stroke — spring return type; also 5" bore, 7½" stroke — spring return type. Above presses are *standard*. Following can be furnished at additional cost: Double Acting, 6" bore, 7" stroke; 6" bore, 11" stroke; 5" bore, 7" stroke; 5" bore, 11" stroke. Special long stroke cylinders also available, up to 48" in length, for incorporation in suitable press frames of our make.

PUMPING UNITS: These units can be supplied in various volumes and pressures, in a total of 13 combinations.

Presses include V blocks, Gauge, Motor Controls, Pressure Regulator, etc., complete and ready to attach to electrical source.

CHECK THESE USES:

There are so many everyday production uses for these versatile KRW Hydraulic Presses that we have lost count. Here are a few of the more obvious . . . blanking, forming, bending, broaching, straightening, stamping, embossing, numbering, upsetting, laminating, pressing and hot or cold forging. KRW Engineers are daily developing other uses. If you have only a vague idea of how these presses might be used in your plant, let us have it in a rough form. We'll do the rest.



MODERNIZE AND MOTORIZE YOUR PRESENT KRW PRESS with one of these compact motor drive units. They come complete ready to connect to your press. Require very little extra floor space. Write for conversion unit prices, giving the capacity and serial number of your press.

BEAT THESE PRICES*:

Depending upon capacity of pumping equipment, prices of Standard model motor driven hydraulic presses are as follows, F. O. B. Factory: 25-ton press from $727.00 to $992.00. 50-ton press from $806.00 to $1058.00. 60-ton press from $1070.50 to $1135.00. 75-ton press from $1198.00 to $1258.00. All motors in the above units are 220/440 volt, 3 phase, 60 cycle. Any change in motor specifications is extra. **Subject to change without notice.*

MAIL THIS COUPON

It will bring you all the money-saving facts about these low cost, high production hydraulic presses. Now is the time to get ready for the highly competitive days ahead.

K. R. WILSON, 215 Main St., Buffalo 3, N. Y.

Please send me complete information on KRW Motor Driven Presses as follows:

☐ 25-ton ☐ 50-ton ☐ 60-ton ☐ 75-ton presses

☐ motor drive conversion unit ☐ Press Cap.

Serial No. .....

Name .....

Address .....

City and Zone ..... *State* .....

K·R·WILSON

215 MAIN ST. · BUFFALO 3, N. Y.

If you are using carburizing steels . . .

Here's where it pays to use U·S·S SuperKore Steels

In many applications like these	in which these steels are generally used	you will save money by using
Aircraft gears, shafts, pinions, etc.	E-3310, E-9310 or equivalent AMS Specification	U·S·S SuperKore A
Heavy duty truck and tractor gears, shafts, pinions, etc.	3316, 9316	U·S·S SuperKore AA
Heavily loaded gears, shafts, pinions etc. and carburized parts used in oil well drilling industry.	4815, 4820	U·S·S SuperKore B
Gears, shafts, pinions, etc.	4317, 4320	U·S·S SuperKore C

Cut your Costs with U·S·S SUPERKORE *steels*

● There's been a lot of talk lately about "dollar metallurgy." It's just a fancy name for metallurgical research that aims to give the steel user more for his money in the way of reduced costs and better product performance. If you want to know how it pans out in reducing the cost of gears, shafts, and pinions *subjected to heavy loads*, put U·S·S SUPERKORE Steels to work.

This is what you'll discover: You'll find that when SUPERKORE Steels are applied, where they should be, you can obtain the same high-core-strength-plus-toughness formerly obtainable only with more highly alloyed carburizing steels. But your costs for steel and your manufacturing costs will be less.

That is because our metallurgists had *lower-users'-costs* in mind when they set out to develop U·S·S SUPERKORE. Because SUPERKORE Steels are lower in total alloy content they cost less to start with. And because the alloying elements are used more effectively and the steels are further improved by special manufacturing practices, SUPERKORE Steels have improved carburizing characteristics. They have better machinability, and they are easier to anneal. Therefore they can be turned into superior finished parts at lower cost.

U·S·S SUPERKORE Steels are now available in four different grades—each designed for a *specific* type of heavy duty service. Find out where you can apply them to reduce your costs, to simplify inventory and specification details. To guide you in their most economical and practical application, the men who developed SUPERKORE will be glad to assist you. The "Superkore Booklet" will give you further interesting information. You can obtain a copy by writing to Carnegie-Illinois Steel Corporation, Room 2070 Carnegie Building, Pittsburgh 30, Pennsylvania.

CARNEGIE-ILLINOIS STEEL CORPORATION, PITTSBURGH & CHICAGO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM
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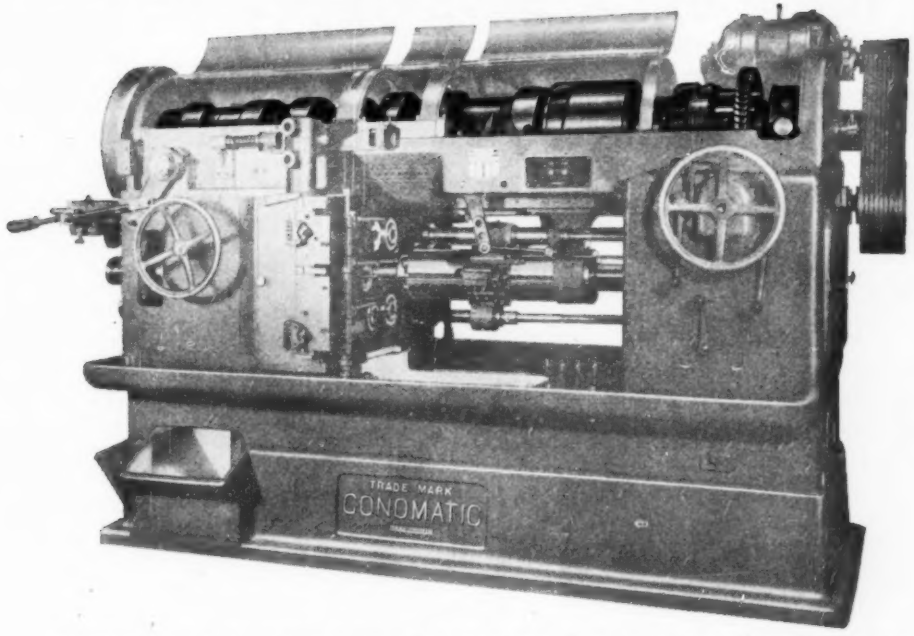
Carilloy Steels

ELECTRIC FURNACE OR OPEN HEARTH
COMPLETE PRODUCTION FACILITIES IN CHICAGO AND PITTSBURGH

9-319

UNITED STATES STEEL

Everything Under CONTROL



The CONE Frame Design centralizes cam control outside of the tooling area, clear of chips. All cams, *visibly* accessible, have a stabilized high-point and are jig drilled. Change is easily made by removing a few screws.

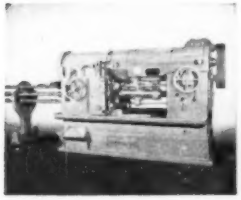
There is no satisfactory substitute to date for a good cam system, but the relative importance of its features should not be confused. Those that control and transfer smooth, positive power, to tool slides and other machine units, are of major importance. A feature of cam change facility, though useful, is less important.

Long runs, or "grouped" short runs, require minimum cam change, and the time for changing cams on any "automatic" is only a fraction of the total required for complete job change-over. A mere turn of a dial changes the working stroke of any slide on the 1" CONOMATIC, but this facility is of minor importance compared to the major advantages of the machine's CONE Cam System.

Any good investment has certain qualifications that prove it profitable. The wise investor and smart banker have some sort of measuring stick to analyze every investment they make. Why not use a chart to guide your purchases of Automatic Bar Machines? If you are already using a chart, perhaps you would like to compare it with the one that we have prepared. Write to us for a copy or ask your Cone representative.

	MACHINE #1*	MACHINE #2	MACHINE #3	MACHINE #4	MACHINE #5
WORK & TOOL CAPACITY	✓				
WORK & TOOL SUPPORT	✓				
WORK & TOOL MAINTENANCE	✓				

*CONOMATIC



A comparison with ALL Automatics will lead you to

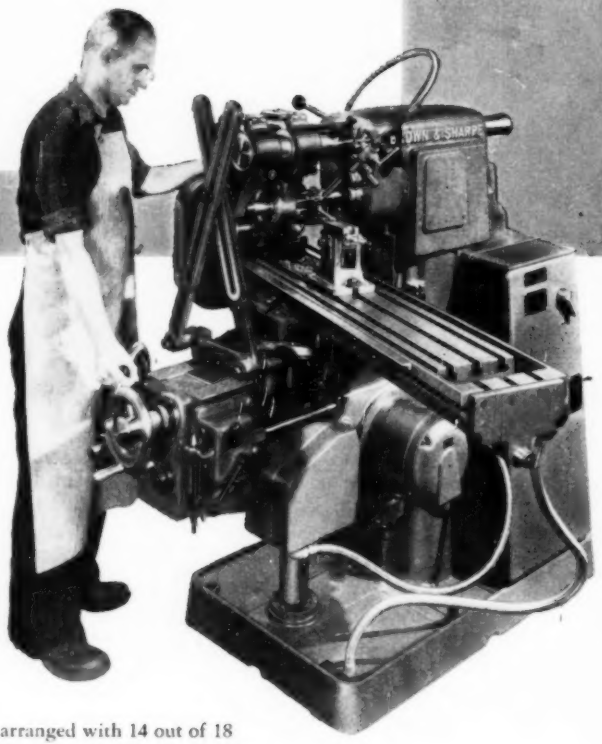
Conomatic

#5

CONE AUTOMATIC MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

Get these extra advantages of *Extended Spindle Face* design

EXCLUSIVE IN BROWN & SHARPE 3 AND 5 H.P. UNIVERSAL AND PLAIN MILLING MACHINES



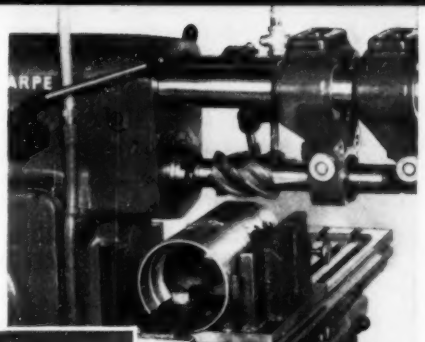
***FIVE** important milling advantages,* results of the Extended Spindle Face design, are illustrated on the opposite page. Each represents a distinct saving in time, in manpower, in cutter costs, or in equipment. All offer exclusive, timely ways to boost the efficiency of your milling operations.

These advantages are "extras", over and above the other well-known advantages of the Brown & Sharpe 3 and 5 Horsepower Machines—maximum power for cutting (three advantageously-placed driving motors avoid loss of power within machine) . . . an excellent choice of feeds in a range where most of the work is done (table feeds arranged with 14 out of 18 under 10" a minute) . . . feed rates uniform in all directions, assuring identical surface finish on those jobs requiring vertical and longitudinal feeds.

Get all the facts about these machines and see where they can help you to improve your milling operations. Write for bulletins on the 3 and 5 Horsepower Universal and Plain Milling Machines. Brown & Sharpe Mfg. Co., Providence 1, R. I., U. S. A.

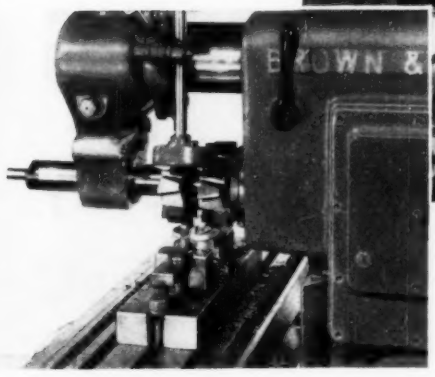
CAPACITIES The 3 Horsepower No. 2 Universal and Plain Machines have a longitudinal feed of 28", transverse feed of 10" and vertical feed of 15". The 5 Horsepower No. 2 Machines have the same capacities except for a 16½" vertical feed.

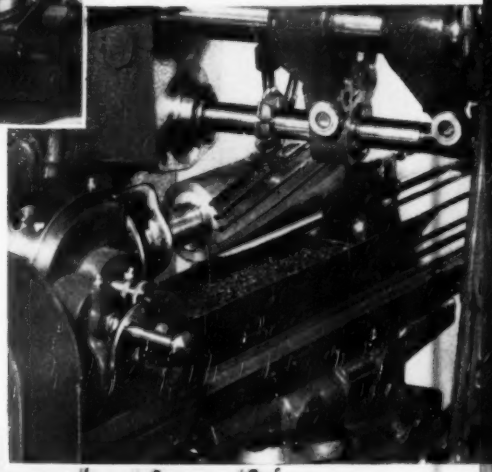
BROWN &



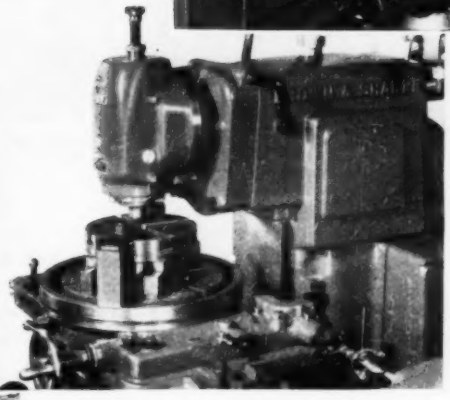
1 ***Reduced cutter costs (both initial and operating).*** Sturdy arbor support permits use of small diameter arbors with small diameter (less expensive) cutters. Cutters mounted close to spindle nose reduce vibration and cutter wear.

2 ***Greater production.*** Smaller cutters feed faster at same surface finish. Shorter run-in reduces total length of cut and minimizes non-cutting time.





5 ***More jobs can be milled without the use of outer braces.*** The Extended Spindle Face design permits mounting the cutters close to spindle nose, reduces arbor length and overarm projection, thereby giving ample cutter support for many jobs ordinarily requiring the use of outer braces.



4 ***More convenient work location.*** Extended Spindle Face design brings the work out toward the operator . . . less reaching . . . less fatigue.

3 ***Greater rigidity of attachments.*** Notice how the Extended Spindle Face design provides extra sturdy support for a Vertical Milling Attachment by shortening the length of attachment projection.

SHARPE B·S

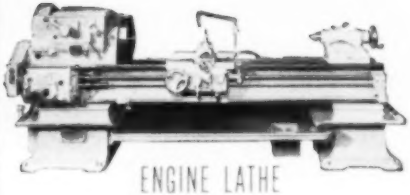
SPRINGFIELD

LATHES

Solve every lathe turning problem

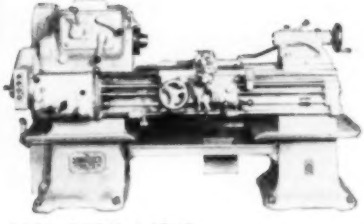
Adaptability to every lathe turning problem and extreme versatility are characteristic of Springfield Lathes. Built with close precision and strict adherence to the highest standards for each component part, they are rugged, reliable, accurate performers on all types of work.

Anyone of the 16 speeds can be selected quickly and easily to meet the requirements of the tool and the work. Low speeds for heavy cuts or high speeds for carbide cutting tools are instantly available. The Springfield 3-lever speed shifting system reduces the amount of shifting required in the normal sequence of operations.



ENGINE LATHE

Sixty quick change threads and feeds give an exceptionally broad setting for many kinds of work. Threads such as 11½ and 27 pitch which usually require transposition gears are included in these ranges and the standard feeds and threads can be varied greatly.



TOOL ROOM LATHE

Easy to set up and operate, these modern lathes are noted for their wide application and their accurate, sustained performance on all lathe turning work. Ask about their adaptability to your own turning problem. Springfield Lathes can solve them—and on a high production schedule.

THE SPRINGFIELD MACHINE TOOL COMPANY

SPRINGFIELD, OHIO, U. S. A.

GENERAL DISTRIBUTORS: BRYANT MACHINERY & ENGINEERING COMPANY, 400 WEST MADISON ST., CHICAGO 6

Exclusive Representatives in All Principal Cities

Century Type RS, repulsion start, induction, single phase brush lifting motors are ideal for installation on reciprocating pumps, compressors and other hard-to-start equipment.

They provide the power to start under load — even in very cold weather — without overmotoring the driven machine.

Repulsion start motors provide greater starting torque per ampere of current than any other type of single phase motor — consequently the least disturbance to line voltage — an advantage on long or small capacity transmission lines.

They are widely used in the rural areas which usually have only single phase energy.

Many power companies are recommending the use of single phase motors up to 7½ HP, in residential districts of the larger cities, because polyphase energy is not always available.

Century Type RS brush lifting motors are built in sizes from ½ to 20 HP.

Century builds a wide range of types of motors from 1/6 to 400 horsepower for all the popular electric power applications.

Specify Century motors for all your electric power requirements

Popular types and standard ratings are available from factory and branch office stocks

CE-628

Century Motors

CENTURY ELECTRIC COMPANY • 1806 Pine St., St. Louis 3, Missouri

Offices and Stock Points in Principal Cities

Van Keuren WIRE TYPE PLUG GAGES

VAN KEUREN FULL 2" GAGE

AGD 1¼" GAGE

WHICH GAGE WILL YOU BUY?

CATALOG AND HANDBOOK No. 34

This 208 page volume represents 2 years of research sponsored by the Van Keuren Co.

It presents for the first time in history a simple and exact method of measuring screws and worms with wires.

It tells how to measure gears, splines and involute serrations. It is an accepted reference book for measuring problems and methods.

Copies are now free upon request.

Wire Type Plug Gages were originated by The Van Keuren Co. over 25 years ago. In 1948 this design was adopted in shorter lengths as the AGD standard for gaging holes from .030" to .510" diameter. The Van Keuren Co., because of years of pioneering, is able to offer the extra length at little or no extra cost.

You cannot afford to lose this extra length. When you need plug gages obtain a quotation from The Van Keuren Co.—Compare COST PER HOLE GAGED. You can be assured of quality and accuracy. A double inspection at the factory eliminates your inspection expense. No time will be lost waiting for replacements. You can count on prompt delivery from a stock of 2 million wires. Specify Van Keuren wire type gages and get the most GAGE for your GAGE DOLLAR.

Send for Supplement 19 showing quick and easy method of getting 4 to 10 gages from 1 VK wire type gage unit.

Available in

TOOL STEEL HIGH SPEED
CHROMIUM PLATE VK CARBOLOY

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THE Van Keuren CO., 173 WALTHAM STREET, WATERTOWN, MASS.

30th YEAR

Light Wave Equipment • Light Wave Micrometers • Gage Blocks • Taper Insert Plug Gages • Wire Type Plug Gages • Measuring Wires • Thread Measuring Wires • Gear Measuring System • Shop Triangles • Carboloy Plug Gages • Carboloy Measuring Wires

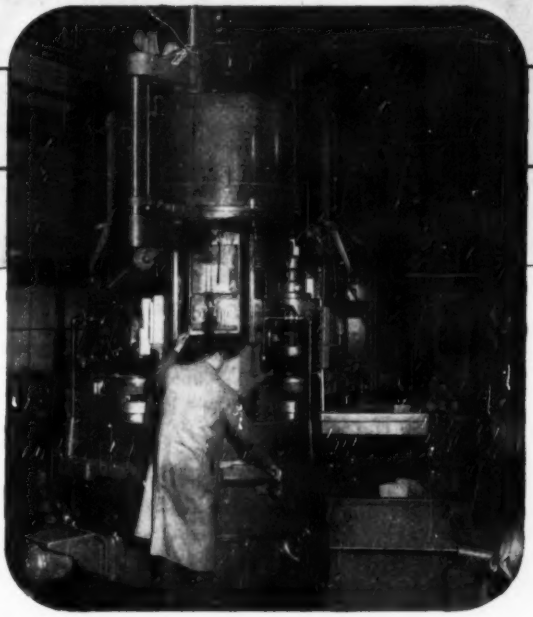
A RUGGED MACHINE FOR

THOSE RUGGED JOBS — *But Fast*

BULLARD

TYPE "D" 16-23

MULT-AU-MATIC



Sta. 1 — Load. Sta. 2 — Rough bore hole, rough turn and sweep chamfer.

Sta. 3 & 4 — Three, rough face and four, second face.

Sta. 5 & 6. Five, finish face and six, true bore, ream, ct' bore, turn and chamfer.

Sta. 7 & 8. Multiple drilling.

BULLARD

Machining Flywheels to close accuracy at a Profit-Making Pace. Rugged work — BUT FAST.

Mult-Au-Matic's rugged construction assures rigidity under heavy cutting. Repetitive accuracy throughout long runs minimizes spoilage and inspection costs.

Mult-Au-Matic design provides for a wide variety of tooling to meet the requirements of a wide variety of work design.

Ask for a Bullard Cost Saving survey of your jobs when applied to the Mult-Au-Matic. Write today.

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

WHY three-

The new General Electric three-phase frequency changer welding control has definite advantages for many users of resistance welders. Below are some of the questions we are frequently asked about it.

Q. I'm planning to install more machines, and my distribution lines are heavily loaded. Should I consider three-phase control?

A. Yes, because it has low kva demand, plus many other advantages. However, it may be more economical to solve your power supply problem another way —we'll be glad to help you.

Q. Can three-phase control be used for different types of welding?

A. It is used for spot, seam, projection, and gun welders, although we do not generally recommend it for the latter because it is usually economically unjustified.

Q. Where is it particularly useful?

A. In welding aluminum. There is little tip pick up and consequently not much electrode cleaning required with three-phase control.

Q. What is the difference between this system and the conventional single-phase system?

A. Basically, the method of producing a weld is the same in both. However, by converting three-phase to single-phase, low-frequency power, there is less reactance and lower kva demand. The bulletin gives more details. Now let's check the advantages shown at right.

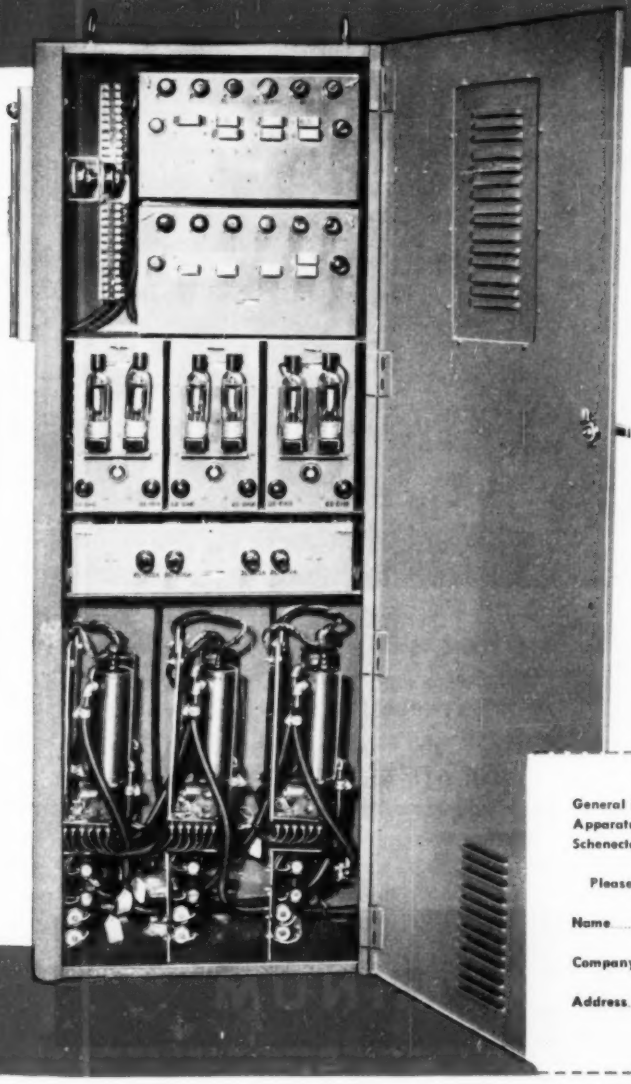
Have you seen

"This Is Resistance Welding"

General Electric's MORE POWER TO AMERICA full-color movie? Clearly describes and explains various types of welding—contains tips for improving production with this process. Ask your welding distributor or the nearest G-E office for a showing.

GENERAL ELECTRIC

phase control for resistance welders?



ADVANTAGES OF G-E THREE-PHASE WELDING CONTROL

1. high power factor
2. three-phase, essentially balanced load
3. low kva demand
4. only one, compact cabinet, machine mounted
5. special features for easy servicing
6. electronic heat control
7. electronic weld timing—dial setting
8. for seam, spot, or projection welders

COME TO GENERAL ELECTRIC

for information, for service, for equipment. You'll get unbiased answers to your questions about control for resistance welding . . . about the welding control for your installation. Write today for Bulletin GEC-491 on the *new* G-E three-phase control.

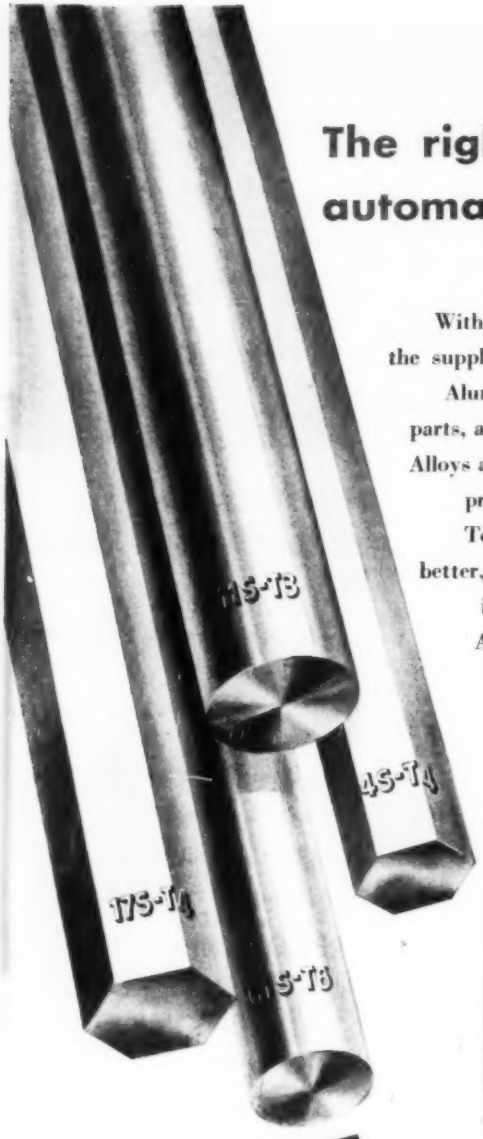
General Electric Company
Apparatus Department, Section G 645-49
Schenectady 5, New York

Please send me a copy of GEC-491 on three-phase welding control.

Name .....

Company .....

Address .....



The right aluminum alloys for automatic screw machine work

With the world demand for aluminum far exceeding the supply, you'll save metal by selecting the right Alcoa Aluminum Alloy for each job. You'll reject fewer parts, and waste less stock.

Alloys are widely different . . . each with varying properties of machinability, workability and strength. To help you know aluminum and its machining better, Alcoa offers you a free copy of "Alcoa Aluminum in Automatic Screw Machines". Write ALUMINUM COMPANY OF AMERICA, 1709F Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA 11S-T3 . . . the best general-purpose aluminum alloy for automatic screw machines.

ALCOA 17S-T4 . . . is stronger than 11S-T3, is best for deep hole drilling.

ALCOA 24S-T4 . . . is even stronger than 17S-T4 and is used for aircraft and other high-strength applications.

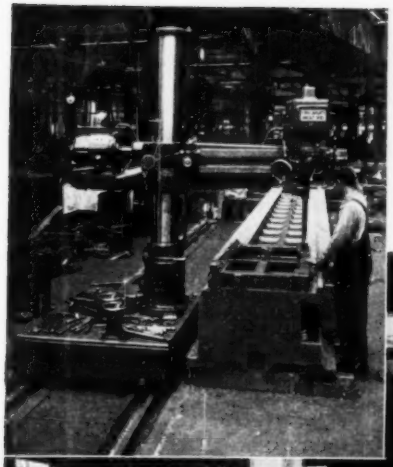
ALCOA 61S-T6 . . . has high corrosion resistance and is particularly adaptable to the patented Alumilite finish.

GOOD MACHINING PRACTICES SAVE METAL

ALCOA FIRST IN **ALUMINUM**

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

VERSATILITY by BICKFORD



BICKFORD SUPER SERVICE RADIALS and BICKFORD ENGINEERING *can Profit you!*

This powerful Cincinnati Bickford Super Service Radial, with its balanced 10′ arm and 26″ diameter column, and modern "clear visibility" head, step saving, time saving centralized controls, special circular base, has brought a high efficiency to the job.

In contrast to this massive machine we show above the 9″ dia. col., 4′ arm Super Service Radial mounted on a track, and here again Bickford engineering and Bickford versatility have met the user's needs—and again given him high production at low cost. Consult us on your drilling problems.

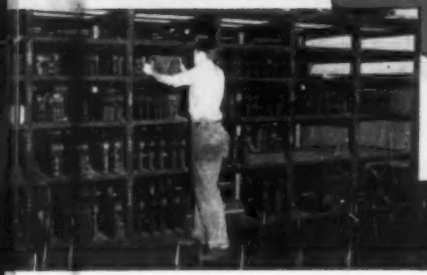
Write for Bulletin No. R-22—on the 26″ column Super Service Radial—and Bulletin No. R-21B, covering the 9″ diam. column Super Service Radial.

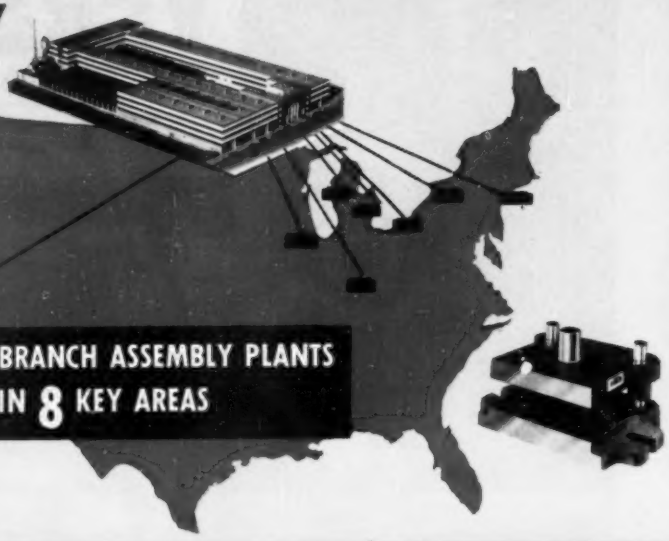
THE CINCINNATI BICKFORD TOOL CO.
RADIAL AND UPRIGHT DRILLING MACHINES
SUPER SERVICE
Radials 7½" dia. col., 2½' arm, to 36" dia. col., 12' arm.
General purpose Uprights, 21" to 28" sizes.
Production Uprights, 21" to 28".
Jig Borers. Portable Horizontals.
Spacing Table Machines.

Equal Efficiency of Every Unit Makes the Balanced Machine

THE CINCINNATI BICKFORD TOOL CO. **Cincinnati 9, Ohio U.S.A.**

Why You Get FASTER SERVICE *from* DANLY





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Complete stocks of all types and sizes of Danly Die Sets are carried in Danly's eight branch-plants.

Call on the Danly Branch Nearest You.

Chicago 50, 2100 South 52nd Avenue
Cleveland 14, 1550 East 33rd Street
Dayton 2, 990 East Monument Avenue
Detroit 16, 1549 Temple Avenue
Grand Rapids, 113 Michigan Street, N. W.
Long Island City 1, 47-28 37th Street
Los Angeles 54, Ducommun Metals & Supply Co., 4890 South Alameda
Rochester 4, 16 Commercial Street
Milwaukee 2, 111 East Wisconsin Avenue
Philadelphia 44, 18 West Chelten Avenue

Write for *free* bulletin

This bulletin contains helpful information and shows how you can use Danly's machining service for "extra" operations on your die set that will save you time and money in the long run.

TAKE ADVANTAGE of Danly's faster service. The die set you order is immediately assembled at a nearby Danly Branch Plant from complete stocks on hand. Save time—simply consult our catalog and place your order with the nearest Danly Branch. Shipment will be prompt.

Precision manufacture at Danly's main plant permits complete interchangeability of die set components. These parts, stocked at each branch, can be assembled into the thousands of possible combinations listed in the Danly catalog. Located in principal die making centers, each Danly branch can make any standard die set immediately available to you.

For prompt service on your next die set order, write, phone or wire "Danly."

NOW—Steel Plate in Stock

Steel stores of plate 1" to 8½" thick permit immediate manufacture of any size special all-steel die set or bolster plate made to your specification.

DANLY MACHINE SPECIALTIES, INC.
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

DANLY

25 YEARS OF DEPENDABLE SERVICE TO THE STAMPING INDUSTRY

PRECISION DIE SETS . . . STANDARD AND SPECIAL

SPOT NEWS OF METALWORKING

Method of stud welding without marring the finished surface has been developed by a Detroit company. No fillet is produced and sheets 0.002 in. thick are unmarked on the other side. Studs can be welded to die castings of all kinds of materials. Automobile makers are reported enthusiastic about possibilities of the new process.

Rubber tubs for new Bendix automatic washing machine are being made by mechanical rubber division of General Tire & Rubber Co. at its Wabash, Ind., plant. They are molded and cured in four cavity hydraulic presses. Thompson Products is turning out the special vacuum pumps for the Bendix machine, which squeezes clothes dry instead of spinning or wringing them.

Tooling for Chevrolet automatic torque converter type transmissions indicates that only about 20% of the cars next year will be equipped with these units.

Steel is made by direct reduction of iron ore in process announced by Pluro, Inc., New York. Finely powdered ores are blown with nitrogen gas into a graphite lined electric hydrogen atmosphere furnace. In less than a minute ores are transformed into liquid ferrous metal. Appreciable savings in time and cost of steel making are claimed.

A system of "bands of employment" has been suggested to its AFL local union by management of an Ohio metalworking firm. One band would include all common labor, the second all semi-skilled, and the third all machine operators. Employees could be assigned any jobs for which they are fitted in the bands in which they are classified.

"We have no present plans for bringing into production a smaller car." Alfred P. Sloan, Jr., General Motors board chairman, says. "It is our belief that present offerings in low-price field represent most effective balance between size, performance, styling and price."

Ford will set up a large pressed metal plant, according to reports, for which presses alone are likely to cost $5 million. This action will make Ford less dependent upon suppliers for body and other sheet metal parts. Plant probably will be located outside the Detroit area.

Sheet and strip steel coils up to 35,000 lb. in weight are being made by steel mills. Plans are afoot for making equipment for press shops to handle coils up to 60,000 lb. Fabricating plants are figuring on installing slitting machinery to avoid charges which soon may be made on narrow width, small coils and to cut strips of exact widths to reduce wastage.

94,000 tons of ferrous and nonferrous scrap in the Marshall Islands has been sold at auction on a high bid of $31,000. It is the last significant amount of surplus war property abroad.

First break in 22-week Warner & Swasey strike in Cleveland came on June 14 when 110 production employees went through a peaceful picket line of the independent Machinists' Union. Number returning to work is expected to grow rapidly. Negotiations between management and union are at a standstill.

India expects to get $100-million loan from World Bank, to be spent for American and Canadian locomotives plus start of construction of new steel-producing capacity.

American management in steel foundries makes more efficient use of less skill, while British stress craftsmanship, according to final report of visit of United Kingdom Steel Founders Productivity Team, first team sponsored by Anglo-American Council on Productivity. In U. S., nearly all real skill is expected from methods and planning engineers, with great emphasis on mechanized processes.

Gaging Metalworking

A further slippage has occurred in the nation's metalworking operations. The only factor which may keep output this month very close to that in May is automobile assemblies, which again are setting peacetime records. Activities in other branches of metalworking are reported to be down a bit compared with a month ago.

► The current lull in buying is traceable to the tendency of industrial concerns as well as of consumers to wait to see what will happen. If carried to an extreme, the paralyzing effect of such a policy will bring on a recession much deeper than anticipated.

► The hope is that the so-called "inventory correction" is well advanced and manufacturers will resume purchases in the near future, even if ordering is on a smaller scale than formerly. The important thing appears to be to get off "dead center."

Trying To Get off "Dead Center"

In an effort to get the appliance business going again, Hotpoint, Inc., has sent to its 10,000 retail dealers a memorandum telling the truth about appliance prices (and is telling the same story to the public in newspaper advertising).

► Hotpoint stresses that prices of first-line appliances are comparable in dollar value, with those prevailing in 1939; that costs cannot be lowered from the present level, with sheet steel and labor such large factors; and that dealers recommend to customers that, under the circumstances, they buy now. Says Hotpoint, "Our procedure with reference to price is very simple. We will always keep Hotpoint a strong competitor price-wise, but Hotpoint will continue to place quality first in every product it produces."

► While Hotpoint emphasizes the futility of waiting for appliance prices to come down further, machinery builders in general are hammering home the same point to users. The present modest volume of machinery production, plus the frozen state of wage rates, makes price reductions impossible.

Metalworking Operations Off

In May, the AMERICAN MACHINIST Index of Metalworking Production fell 8 points to an even 200, with 1939 taken as 100. The index is off 22 points from a year ago and 20 points from January.

► But one should remember that the Ford strike pulled down the "automobiles" component from 226 to 206, an unnatural drop for the height of the spring season. If it had not been for the work suspension at Ford, it is likely that the automobiles component woud have forged ahead of the 225 figure which prevailed last year.

► The "machinery" component was down sharply from 220 to 209. The "all others" component, representing a vast array of metal products, is now at 138, being much closer to the 1939 level than any of the other four components of metalworking production which comprise the index.

Machine Tool Sales Drop

Machine tool orders in May totaled 64 on the index of the National Machine Tool Builders' Association. That represents a considerable decline from 70.1 reported in April. Shipments, on the other hand, slid down only a little, to 73 from 74.4 the previous month.

► Export bookings last month were about 25% of the total. So far as backlogs are concerned, foreign orders now make up 30%. One point should be borne in mind: as domestic business declines and foreign remains unchanged, the latter gains in ratio to the total.

► The entire machine tool industry will watch with deep interest the effect on sales of the $3 million revolving credit fund granted by Export-Import Bank to 11 machine tool builders banded together as Amertool Services, Inc., to secure Latin-American orders.

Detroit Is Promising Market

Most machine tool builders do not feel optimistic about the summer months. Many will shut down for one week or two weeks next month for plant-wide vacations. The feeling is that June sales will be off from May. A number of companies are running 32 or 35 hr. a week, and a few are even lower than that.

► Detroit still is relied upon as the most promising domestic market. Tooling for 1951 models will require new machine tools. Still more tooling for automatic transmissions and some changes in engine design to take advantage of higher octane gasoline will provide the bulk of the work.

Steel Rate Declining

Steel is suffering for lack of orders. The operating rate is declining week by week; prospects are that it will continue to slide. The decrease stems from two sources: the abnormal inventory position of many users, and a cut in production, with less steel being chewed up. Consumers obviously are taking just as little tonnage as possible until they feel that steel prices are stabilized, at least for the short term ahead. As of today, they believe that some softening of prices is in the cards.

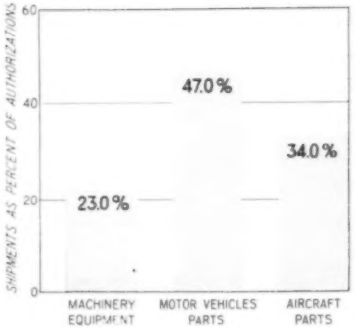
► Alloy steel mills in particular are suffering. One prominent mill, for

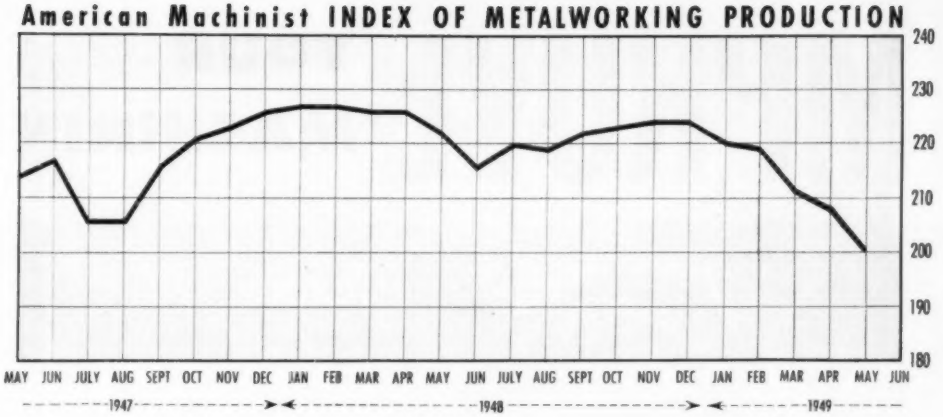
ECA ACTUAL SHIPMENTS

As percent of authorizations
Cumulative through April 1949

	Procurement Authorizations (Millions of $)	PAID SHIPMENTS (Millions of $)
MACHINERY & EQUIPMENT	444.8	102.1
MOTOR VEHICLES	103.6	48.7
AIRCRAFT PARTS	43.8	14.9

DATA: McGraw-Hill Dept. of Economics





	INDEX	COMPONENTS				
		MACHINERY	ELECTRICAL MFG.	AUTOS, TRUCKS	TRANSPORTATION EQUIP.	OTHER METAL-WORKING
May 1949 (preliminary)	200	209	196	206	283	138
Apr. 1949 (revised)	208	220	201	226	289	140
May 1948	222	251	229	225	289	144

AMERICAN MACHINIST'S INDEX OF METALWORKING is based on manhours worked in five segments, which are "weighted" as follows: Machinery, 32.5—Auto & Trucks, 22.6—Electrical Manufacturing, 15.4—Transportation Equipment, 12.4—All Other Metalworking, 17.1. Index figures are a percentage of 1939, which equals 100.

example, is down to one-third its operating rate of last January. Though others are not as badly off as that, alloy steel output is relatively low.

► The situation in non-ferrous metals differs only in degree from that in steel. Prices have broken badly and buyers are reducing inventories radically. Demand has dropped sharply the last 30 days and shows no signs of an immediate pickup.

Automotive Parts Releases Good

Suppliers of component parts for automobiles declare that releases are continuing in large volume. Car assemblies have risen to around 135,000 units a week, but are not expected to stay at that height very long. There will be a considerable tapering in the third quarter and perhaps even more in the final quarter.

► Releases of parts for shipments to tractor and farm implement companies have been curtailed slightly, but are in sufficient volume to keep suppliers going at a good rate. Builders in this field have been less affected by the recession in business than almost any other industry.

► Household appliance manufacturers are down far below capacity, in some cases operating at only 50% or less. Several companies say that they are hard hit by the fact that buyers are spending their money for television sets in centers where television has good reception.

► In the electronics industry, work is proceeding at a fast pace. The federal government alone will spend $172 million on electronic and communications equipment in the 1950 fiscal year. And television production this year, measured in units turned out, may be as much as four times the volume of 1948.

Metalworking Ahead of Other Industries

While metalworking has dipped during the first five months of this year, it is well ahead of the performance of manufacturing industries as a whole. Proof: the American Machinist index, based on manhours worked, is exactly double the 1939 rate. In contrast, manufacturing industries are turning out only about 70% more than in 1939.

Employment Rising

The fact is that both employment and unemployment are rising. They are gaining because the "labor force"—total of all people at work or who want to work—is growing. The labor force, including the armed services, now amounts to 63.4 million, compared with 61.6 million in May a year ago.

► Unemployment last month was put at 3.3 million, as against 1.6 million in October and 1.7 million last May. Employment now is estimated at 58.7 million, excluding 1.5 million in the military services. Last October it was 60.1 million and in May, 1948, was 61.6 million.

Major Inventory Shift

Inventories of all manufacturers, including those in metalworking, are dropping. Though no conclusive figures are at hand, a major shift is taking place. Stocks of finished products have been expanding while raw materials and work in process have been shrinking. It is believed that May and June final figures will show not only a substantial decline in materials and parts in process, but also a leveling off of finished goods. Many raw materials, such as copper, are being used up much faster than they are being shipped by producers.

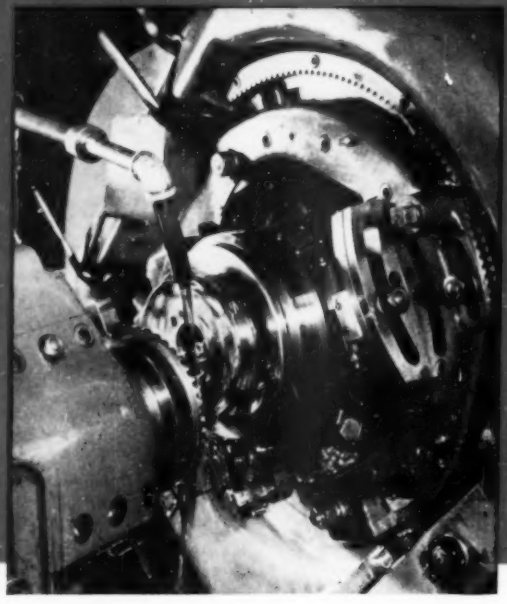
Stamping Inquiries Brisk

A flood of inquiries is reported by metal stamping manufacturers. Many of the inquiries come from customers who are changing the design of their products. Makers of stoves, refrigerators and other household appliances are involved in these inquiries.

► Actual production of stamped steel parts is not much below that of a year ago, based on first-half reports. Stamping plants, however, are digging into backlogs to keep operations at the current level.

► Some stampers are taking sizable losses on steel bought in the gray market and now being fabricated for users at lower prices for the end products than those which prevailed six months ago.

IMPROVE YOUR MACHINING



Texaco cutting coolants help you cut faster, at lower cost, with smoother finish

IT makes no difference whether you machine steel, copper, aluminum, brass or any other metal . . . there is a *Texaco Cutting, Grinding or Soluble Oil* to help you do the job faster, cleaner and at lower cost.

Texaco Cutting, Grinding and Soluble Oils effectively lubricate work and tool — keep them cool and prevent chip welding or wheel loading. Thus, you get more cuts per tool grind, finer finish, fewer rejects — better machining whatever the metal or cutting method.

Let a Texaco Lubrication Engineer who specializes in cutting coolants advise you which Texaco oil to use for best results.

Just call the nearest of the more than 2300 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

American Machinist

MAGAZINE OF METALWORKING PRODUCTION ★ ESTABLISHED 1877

The Foreman Is Your Ally

In any attempt to cut costs in the shop, do not overlook the foreman as your major ally.

It is all right to give the over-all job to your industrial engineers, or perhaps to bring in management engineers from outside.

But much of what you wish to accomplish can be done by using your own foremen.

"Providing the foreman with the tools of methods-improvement," states John A. Patton, Chicago management engineer, "is the real and most effective means to cost reduction."

Mr. Patton points out the advantages of such a program. Instead of having only one or two engineers working on cost reduction, you will have all of your supervisory force on it.

That means, too, that outside prejudice is minimized or entirely overcome. In general, a program generated inside a plant is accepted more gracefully and with greater enthusiasm by everyone than a program from outside.

A foreman is no different from other people. He takes pride in his work and likes responsibility. If he is made to feel that he is a key factor in cost reduction, he will go at his task aggressively and will take a personal interest in it.

Who knows as much as the foreman about the places in his department in which costs can be slashed?

What is more, the fixing of responsibility on the foreman opens his mind to change. He realizes that his management is deeply concerned in making improvements. He thus is encouraged to suggest ways and means of making his own operations more efficient.

What is better, then, than to reward him in some tangible manner for his achievements in pruning costs? There is no quicker or surer way to enlist his interest and convince him that management means business.

The training of foremen is a necessary preliminary step before making them part of your cost-reduction program. Such training should be a continuing process, not just a one-time "shot-in-the-arm."

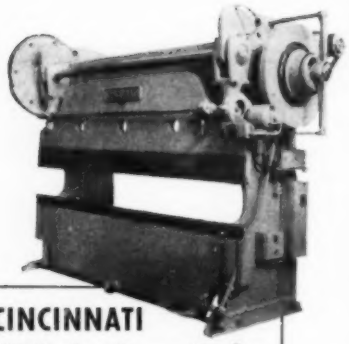
They should be made to feel that they *are* management. They should have a full grasp of management's philosophy, of its objectives, of its methods of doing business. They should be educated to handle men. They should be kept abreast of the new production methods.

And that gets back to an observation by Mr. Patton, echoed by many others, "The best dollar any company can spend today is in training its foremen."

Adequately trained foremen today should be the platoon leaders in the assault on production costs. If management does not employ them for this purpose, it is failing to use one of its most powerful and effective assets.

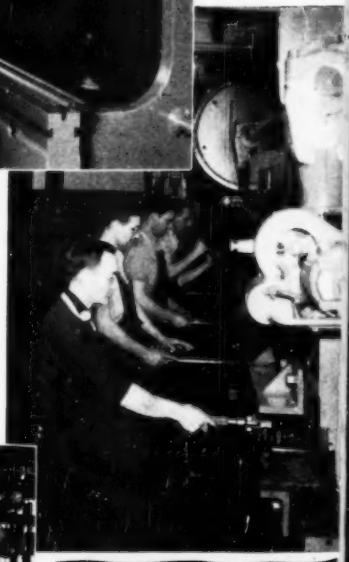
Burnham Finney

EDITOR



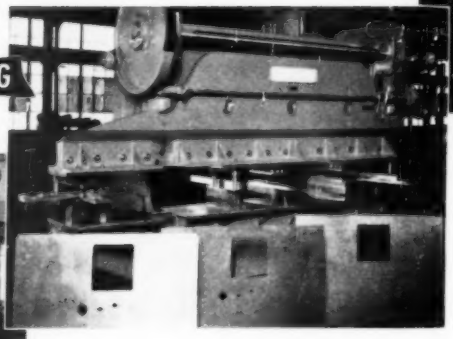
CINCINNATI
50 Series Press Brake

BENDING



MULTIPLE OPERATIONS

USE THIS CINCINNATI FOR ECONOMY...



BLANKING

PUNCHING and PIERCING

For economical handling of the many jobs where greater pressures and larger machines are not required, the Cincinnati 50 Series Press Brakes are outstanding in their performance.

They have all the features of the larger Cincinnati Press Brakes, and offer productivity, accuracy and versatility with low initial investment.

Write for Catalog B-2A, and ask our Engineering Department for details on the many uses of the smaller Cincinnati Press Brakes.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO U.S.A.

SHAPERS · SHEARS · BRAKES

COMPLAINT ANALYSIS CHART

ORIGINAL ✓ FILE: A
FOLLOW UP ____ CQ MOTOR NO. 3

	YES	NO
IS THIS TYPE OF COMPLAINT COMPETITIVE?	✓	
DOES COMPLAINT AFFECT CUSTOMER RELATIONS?	✓	
IS COMPLAINT PECULIAR TO A GIVEN LOCALE?		✓
IS THIS TYPE OF COMPLAINT UNDER INVESTIGATION?	✓	
IS THIS TYPE OF COMPLAINT PECULIAR TO OUR PRODUCT?		✓

	MAJOR	MINOR
SERIOUSNESS OF COMPLAINT (If more than one "YES" occurs, mark box as Major)	✓	

COMMENTS:

	YES	NO
IS COMPLAINT CORRECTABLE IN THE FACTORY?	✓	

INSPECTION ✓ WORKER ____ FOREMAN ____ DESIGN ✓ SALES ____
PACKAGING ____ TRANSPORTATION ____ MATERIAL ____ PURCHASING ____ OTHER ____

ACTION TAKEN ON THIS COMPLAINT

REPAIR ____ REPLACE ✓ REFUND ____ RESHIP ____

COMMENTS: Heavier insulation to be used on field windings
Inspection to give test using Eng Spec 581
S.R. Jones 2/24/49

Full record on each complaint is essential. Chart insures that important questions concerning circumstances under which complaint occurred will not be overlooked, that cause of poor product performance is determined, that action is planned to avoid future occurrences, and that department affected accepts its responsibility to eliminate cause of trouble. Keyed entries at upper right denote type of complaint and geographical area of country in which complaint arose. For example, A indicates *short circuit*, 3 is *southwestern* area

WATCH YOUR CUSTOMER COMPLAINTS

Every company should insure its reputation in the field by the proper handling of customer complaints at the factory

BY WM. A. MAC CREHAN
College of Engineering, NEW YORK UNIVERSITY

CUSTOMER complaints indicate points at which product performance is not living up to customer expectations. Yet company reputation depends on the service its product renders. Thus, every complaint is important, and to insure that each receives the attention it deserves, management must establish a definite, well-organized complaint procedure.

Included in a sound plan to control complaints are five steps: (1) honest advertising; (2) planned organization of complaint reports; (3) a factual method of assigning the fault responsibility to people who can correct the errors; (4) a straight-forward report of complaint progress to top management, and (5) a study of the comparative costs of on-the-spot settlement.

To establish a firm foundation, advertising must truly represent the performance capability of the product. Influencing the consumer to expect more than the product can give simply lowers the bars to needless customer complaints. It is only when advertising honestly and ethically specifies design capabilities that the product in field service will support the advance literature and will in no way embarrass company reputation.

The second step is to route complaints through a central source that can collate, tally, and evaluate them. Experience has shown that

meetings held periodically to assign responsibility are the best medium for instigating corrective action. All interested parties are present and "buck-passing" is minimized. When action has been decided, complaints are routed back to the initial source. Here they are evaluated, and tallied into a top-management report.

Checks All Details

Step three is to obtain *facts* on the complaint. These are then recorded on the Complaint Analysis Chart. In the upper right-hand corner, "File" pertains to type of fault in the complaint and "Number" refers to area of the country in which the complaint occurred. Whether the complaint is original or previously reported is noted in the upper left corner.

Next, five questions are asked to clarify the status of the complaint and determine its seriousness.

"Is this type of complaint repetitive?" This question seeks to determine whether the complaint occurs as a constant source of irritation because of manufacturing difficulties.

"Does this complaint affect customer relations?" There are times when goodwill cannot be measured in cold cash. Consideration should be given to the conditions surrounding each complaint.

"Is this complaint peculiar to a given locale?" Problems of temperature, humidity, and oxidation often vary widely throughout areas in which the products are used. Area complaints are a key to design improvements.

"Is this type of complaint under investigation?" Chasing down items already under investigation is wasted effort. Do the job thoroughly the first time and plan a sound program of action.

"Is this type of complaint peculiar to our product?" All too many times one product is purchased over another simply because of minor complaints registered against the second product. This occurs even though the second product can do a job equal to that of the first. Soap powders that cause sneezing is a good example of this situation.

Now the checks in the boxes are tallied. More than one box marked yes classifies the complaint as *major;* otherwise the complaint is *minor.* The form allows space for comment where unusual factors alter this arrangement.

Fixes Responsibility

The second portion of the form contains the question, "Is this complaint correctable in the factory?" Should the answer be *yes* then a request for investigation should be assigned to the department responsible. "Witch hunts" yield only ill feeling; be sure of areas of responsibility within the industrial organization.

In addition to corrective action, it is also important to know what immediate action is taking place so customer goodwill is protected. The form indicates four possible procedures: (1) repair; (2) replace; (3) refund; and (4) reship. Each of these actions represent a policy decision and should be made with a serious intent to satisfy consumer contingencies.

The final portion of the form allows for comments that result from the group meeting. These comments are particularly valuable, as the cooperative effort of skilled minds yields a harvest of corrective ideas when *facts* are the basis for complaint consideration. Next, we should consider reporting complaint data. Experience has shown that a monthly report generally is satisfactory unless a special epidemic of complaints arises.

In making the report the question arises, "Do we plot a tally of this month's complaints against this month's production or do we plot the complaints against production of the period of their shipment?" For simplicity of operation, a calculation of the time lag from date of delivery to receipt of complaint is the most favorable procedure. This is accomplished through the Complaint Time Analysis Sheet.

How to Assign Complaints to Month in Which Unit Was Produced

COMPLAINT TIME ANALYSIS SHEET

ELAPSED TIME: MONTHS	NUMBER OF COMPLAINTS 5 10 15 20 25 30 35 40 45 50	A TOTAL COMPLAINTS	B CELL VALUE	A×B TOTALS
1				
2	//	2	2	4
3	///	3	3	9
4	////	5	4	20
5	//// /// /// /	16	5	80
6	////	4	6	24
7	/	1	7	7
8	/	1	8	8
9				
10				
11				
12				
COMPUTATION: $\frac{\Sigma fx}{n} = \frac{152}{32} = 4.75$ Average Delay factor		$n =$ 32		$\Sigma fx =$ 152

Time lag between receipt of complaint and month in which unsatisfactory equipment was produced is determined from above data. For example, with 4.75 average delay factor, complaints received in May are charged against January production. Procedure is to record all complaints received in given month. Figures for past eight months then form basis for computation. When figures for new month are added, those of oldest month are dropped, and "cell" values from 1 to 8 are assigned consecutively to each month starting with oldest. Column totals are equated as shown to give delay factor

SIMPLE COMPUTATIONS GIVE VALUES FOR CONTROL CHARTING COMPLAINTS

COMPLAINT ANALYSIS DATA SHEET

YEAR & MONTH	COMPLAINTS (C)	PRODUCTION (P)	INDEX ($\frac{C}{P}$ x 100)
1948			
Jan	37	7110	0.52
Feb.	43	6950	0.62
Mar.	52	7595	0.68
Apr.	47	6880	0.68
May	56	7220	0.78
June	39	7850	0.50
July	38	5570	0.68
Aug.	24	8010	0.30
Sept.	36	7430	0.48
Oct	40	5648	0.71
Nov	34	7660	0.44
Dec.	52	5840	0.88
1949			
Jan	23	4710	0.48
Feb.	35	5865	0.60
Mar.	29	5235	0.56
Apr.	32	8100	0.40
May	34	5356	0.64
June	27	4741	0.58
	Σ 678	Σ 117870	

COMPUTATIONS:

For: Index of Customer Complaints

Index = $\frac{C}{P} \times 100$

Example: June, 1949

$\frac{27}{4741} \times 100 = 0.58$

For: Limits of Index variability

Upper control limit: $\bar{P} + \frac{3\sqrt{\bar{P}(1-\bar{P})}}{\sqrt{n}}$

Lower control limit = $\bar{P} - \frac{3\sqrt{\bar{P}(1-\bar{P})}}{\sqrt{n}}$

where, $\bar{P} = \frac{\Sigma C}{\Sigma P}$ & $\sqrt{n}$ = production/month

Example: June, 1949

$\bar{P} = \frac{678}{117870} = 0.58$

$3\sqrt{\bar{P}(1-\bar{P})} = 3\sqrt{0.58(1-0.58)} = 1.479$

$\sqrt{n} = \sqrt{4741} = 69$

$\frac{3\sqrt{\bar{P}(1-\bar{P})}}{\sqrt{n}} = \frac{1.479}{69} = 0.021$

$UCL = \bar{P} + \frac{3\sqrt{\bar{P}(1-\bar{P})}}{\sqrt{n}} = 0.58 + 0.021 = 0.601$

$LCL = \bar{P} - \frac{3\sqrt{\bar{P}(1-\bar{P})}}{\sqrt{n}} = 0.58 - 0.021 = 0.559$

Basic data is recorded and complaint index is computed each month. Computed value is plotted on Index of Customer Complaints, a chart that reports complaint trends to management. Also computed each month are the control limits for the index. These values are based on the 18-month period preceding date of computation. As the figures for each new month are added, those for the oldest month are eliminated. Thus, above data are for June 1949. Limits are plotted on chart, Limits of Index Variability, to indicate to control engineer when factors other than chance are operating in producing reasons for complaints. Causes then may be traced

This device quickly establishes a mean average that serves as an index for general calculation. For example, a three months' delay from Complaint Time Analysis Sheet would plot complaints received in December against production figures for September. The assumption is that material shipped in September yielded the complaints that were received in December.

This practice enables a close correlation of complaints with production and gives a true picture of the complaint trend. Charging complaints against the production of the month in which they are received gives a misleading picture and often fails to warn management of dangerous changes in the complaint-production ratio. For example, production in January may be 1000 units and 6 complaints may come in; the following month, production may be 500 units, yet 18 complaints come in. Obviously, charging these complaints against January or February production does not give the actual picture. But this condition can be overcome through computation of the time-delay factor.

Varies with Product

The basis for the computation will vary with the nature of the production. In the example shown, eight months was considered satisfactory. However, some plants prefer a 12-month base, others 6, and so on.

Once computed, the delay factor may be used for several months. In most cases, a computation about twice a year will be sufficient to determine whether any factor has entered to change the time lag.

Now, knowing how to organize the complaints as received, and how to compute the time lag, the next point is to find some way of obtaining a norm or a bogey to judge if efforts are producing results. For this purpose, the Complaint Analysis Data Sheet is compiled. All facts are recorded on this sheet. Then, each month complaints are equated to production to give a percentage value that may be termed a complaint index. This index shows actual performance from month to month.

But to be of most use the current index must be compared against a base. This base is obtained by averaging the index values for the preceding year. For example, values for 1948 are averaged as a norm against which 1949 performance can be compared. This norm is an average of the

averages for stability and centralizes variations in seasonal production, cyclical production, and "spot-order" fluctuations.

Informs Management

At this point in our management planning we have all the tools to take step four: namely, to give top management a report that will indicate how successful the control operations are performing. To do this in a simple and direct manner, the Index of Complaints is suggested.

As we are dealing with post-mortem problems on manufactured items, we should note if similar products are being still made under the same design conditions. Assignable causes of high percentage points can thus be noted on the chart. Recurrence of a corrected item indicates lack of proper control.

A busy executive need only glance at the Index of Customer Complaints to know the trend of consumer opinion on the quality of the manufactured product.

Our planning has taken us through to the top management report, but good organization should not stop there. It next brings into the picture at the lower echelon of control engineer activity the scientific tool of statistical analysis.

In the management report there will be some fluctuation of percentage points because of a series of constant variable causes within the factory. Thus it would be valuable to know when a percentage exceeded normal variation and could be classified as a biased condition. Because the percentage points in themselves are attributes, or fixed limits, we can turn to Fraction Defective Probability Charts, commonly referred to as "P" charts. We have most of the data needed in our Complaint Analysis Data sheet and need only to calculate $\bar{P}$ as shown in the example on the data sheet. Using the basic formula,

$$\text{U.C.L.} = \bar{P} + 3\sqrt{\frac{\bar{P}\,(1 - \bar{P})}{n}} = \bar{P} + \frac{3\sqrt{\bar{P}\,(1 - \bar{P})}}{\sqrt{n}}$$

$$\text{L.C.L.} = \bar{P} - 3\sqrt{\frac{\bar{P}\,(1 - \bar{P})}{n}} = \bar{P} - \frac{3\sqrt{\bar{P}\,(1 - \bar{P})}}{\sqrt{n}}$$

upper and lower control limits for chance variation may be computed.

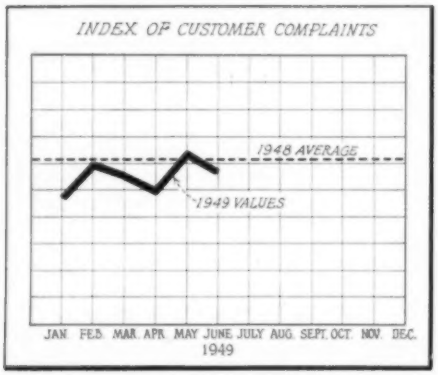
The end result is a performance chart such as the one titled, Limits of Index Variability.

The fifth step of the planned program is Complaint Costs. Here field service stations are coordinated with factory methods. Factory engineers visit actual field complaint stations so each man in the organization is clearly aware of the function of the other fellow.

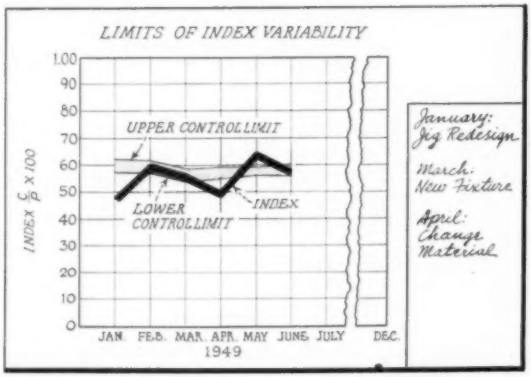
Complaints under a certain predetermined amount should be settled right at the field office. Johns-Manville made the flat decision that all field complaints of less than $25 should be settled by the salesman. The dollars of paperwork savings are intangible, but the goodwill results are obvious. Consumers felt that the reputation of the product was being fully supported by the manufacturer.

The result of our efforts yields a simple clear routine that involves honest advertising, accurate complaint information, factual assignment of complaint responsibilities, straight-forward management reports, and an awareness of complaint cost factors. These tools turn customer complaints from "Blue Monday" into "Sunny Tuesday", if statistical analysis is used wisely, accurately, and thoroughly.

Chart for Management Looks Like This . . . Control Engineer Needs This Chart . . .



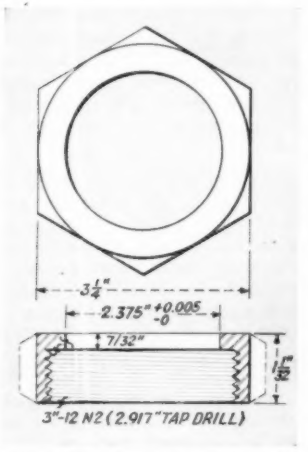
Report to plant management shows overall complaint progress and affords comparison between current performance and 1948 average. Graphic presentation of percentage values taken from Analysis Data Sheet clearly indicates trend on complaints. Similar charts may be constructed for any department of the plant or for any product in the line



Control limits establish range within which complaint index will fall if only chance operates in creating causes of complaints. If index exceeds upper limit of range, bias is present—i.e., a given factor, such as jig, fixture, tool is contributing to cause of complaints—and a concerted effort must be made to find cause of trouble and eliminate it. Notations at right indicate changes made that have influenced complaints

Smooth threads on bar stock and castings can be produced by employing suitable tools, cutting speeds and coolant, and keeping tools sharp

Tapping of a $\frac{1}{2}$-in. union nut is done at 25 sfpm, and the production quota on an automatic screw machine is set at 135 php to suit shop standards



Floor-to-floor time to produce a cast 2-in. valve nut is 1.4 min on a 5-spindle chucking machine. Tool life equals 400 pcs per grind

Don't Fear Threading of Stainless

High output rates and uniform quality result from careful selection of equipment and tool materials and from special attention to operator training

BY J. J. ROBERT,
Ass't General Manager, Stainless Engineering & Machine Works
THE COOPER ALLOY FOUNDRY COMPANY

SOME PEOPLE think that it is difficult to thread stainless steel. Our experience shows that properly trained personnel, using carefully selected equipment, can thread and tap stainless steel at high production rates, and achieve uniformly high quality.

Proper tool selection is extremely important for all machining operations on stainless steels. Tungsten high-speed-steel tools meet most machining needs. Cast alloys are preferred for increased speeds. Cemented carbides are recommended on many continuous cutting applications.

For threading and tapping, it is essential that tools be especially high in toughness. In all cases, the choice of the tools depends on the specific application. In many instances, various types of tools are successfully used in combination.

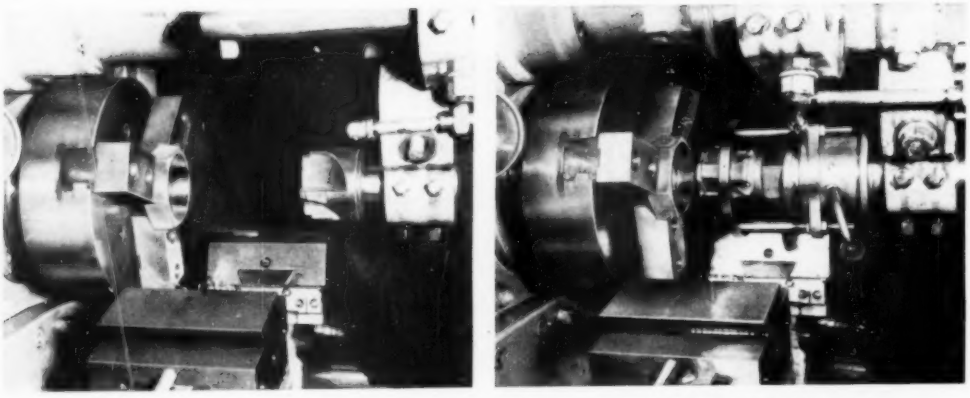
Generally speaking, cutting speeds for stainless steel are considerably slower than for carbon steels and the power required is approximately double. Tools should be properly ground and kept sharp at all times; otherwise, they will break down rapidly as the cutting edges start to dull, as well as roughen and tear the metal being machined.

In machining stainless steel, high temperatures are generated by the cutting action, and there is considerable friction as the chip passes over the cutting face of the tool. Hence, there is an inclination for chips to weld to the tool. Use of sulphurized cutting oils is recommended to prevent the welding action. Best results have been achieved with a sulphur-base oil, having a small percentage of vegetable or animal fat to serve as a lubricant.

Machine threading of stainless steels, we find, is most successful with a self-opening tangential-chaser diehead. It is recommended that the lip rake angles range from 22° to 25°. Chasers having leads of about three to four threads give long life. If necessary, short-lead chasers may be used satisfactorily for threading to shoulders or in other applications where space will not permit long leads. Additional space to permit ejection of the chips and small particles should be left between the land of the die and the work and also in front of the diehead.

A cutting speed of between 15 and 40 fpm is used for most production work involving diehead threading. Actual speed depends on the pitch of the thread, the type of thread (taper or straight), and the condition of the material being cut. The same general practices hold true for tapping. A collapsible tap is preferred where hole size permits.

Lathe threading of stainless steel involves the use of tools having 6° to 9° top rake; 9° to 12°



***A Tantung forming tool** (left) finishes the ID for tapping, reams the smaller hole, produces an internal chamfer and a square shoulder. Threading (right) is carried out at 57 rpm by a collapsible tap*

side rake. Depth of cut should start at 0.025 to 0.035 in., and diminish to 0.005 in. in the finishing cut. This procedure results in a smooth, even thread. Recommended speed for cutting American Standard pipe threads is approximately 25 fpm.

The discussion thus far represents the thinking behind specific practices in use at modern machine shops where stainless steels are being handled regularly. To demonstrate how these ideas are put to work at the Stainless Engineering & Machine Works, detailed information will be given on three representative jobs. These are: (1) a ¼-in. union nut, (2) a 2-in. globe valve nut, and a 1-in. union-bonnet, globe-valve body.

Case 1 . . Bar Stock Product

The ¼-in. union nut is machined from Type 303 stainless steel, a free-machining, sulphur-bearing grade. Cold-drawn 1⅛-in. hexagon bar is used. Machining is done at 65 sfpm on a 5-spindle Warner & Swasey automatic screw machine. Between 4,000 and 5,000 pieces are required per setup. The main toolslide is set for a 0.0099 in. feed; the tapping is done with a special leading-on attachment.

The sequence of operations and the tools and speeds employed are given below:

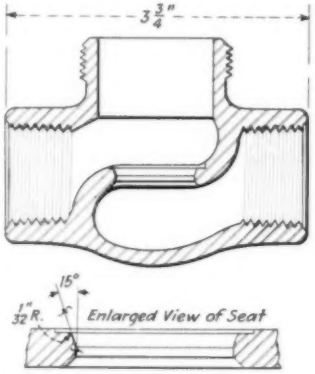
First Tool Position—Drilling is done from the main toolslide. From the cross-slide we form the chamfer and bread down for cutoff. High-speed-steel drills are used. A Tantung form tool is used.

Second Tool Position—The Tantung forming tool now reams the ID for threading, forms a square shoulder and puts an internal chamfer on the bottom.

Third Tool Position—Tap the 1-in., 14-thread at 25 sfpm.

Fourth Tool Position—Drill the small-diameter hole and break down for cutoff. High-speed-steel drills and a Tantung form tool are used.

Fifth Tool Position—Cutoff is made with a Tantung parting tool.



A diehead at the third tooling position of a chucking machine produces the 1¼-in. external pipe thread on the cast valve body

Proper selection of tools has resulted in an efficiency rating of 94.5%. The theoretical cycle time for these union nuts is 23.7 sec., giving the machine a maximum efficiency of 149 pph. Shop standards are based on a production quota of 135 pph.

Case 2 . . Stainless-Steel Casting

The 2-in. valve nut is machined from a 3¼-in. hexagon casting made from Type 316 chromium-nickel stainless steel. The job is run on a No. 1AC Warner & Swasey chucking machine. Originally, this job was done on a modern turret lathe with a floor-to-floor time of 4½ min. With the present method, the floor-to-floor time is 1.4 min using conventional air chucking. Tool life for this job is approximately 400 pcs per grind. Operations and tooling are:

First Tool Position—A multiple boring tool is used to machine the small and large diameters. Front of the nut is faced. Carboloy 78B is used for the two boring tools as well as for the facing tool. Operations are performed at 102 rpm at 0.010-in. feed.

Second Tool Position—Skip index.

Third Tool Position—A Tantung forming tool reams the small diameter hole and tapping size, also forms an internal chamfer and square shoulders.

Fourth Tool Position—Back cham-

fer with tool in slide at 340 rpm and 0.014-in. feed. A Carboloy grade 78B tool is used.

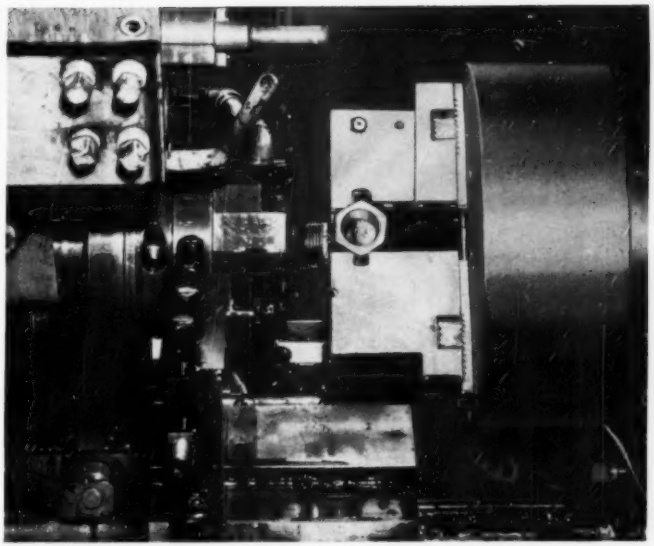
Fifth Tool Position—Tap a 2-in., 12-pitch thread at 57 rpm with a Landis Type LT collapsible tap.

Case 3 . . Cast Valve Body

The 1-in. globe-valve body is cast in Type 304 chromium-nickel stainless steel. Machining is done on the No. 1AC Warner & Swasey chucking machine, using a 10-in. two-jaw air chuck with special jaws—one nesting and one compensating. Tooling and machining operations are:

First Tool Position—Rough bore the two internal diameters using Carboloy tools, Grade 883. Rough slab face and rough turn the O.D. with grade 78B Carboloy. The job is operated at 102 rpm with a 0.010-in. feed.

Second Tool Position—Turn the OD and chamfer for threading. Carboloy 78B tools are used. Remaining operations including finish bore of both diameters, counterbore of face around valve seat, and rough form of valve seat—all accomplished with Tantung forming tools.



***Cast valve bodies** are held in a special two-jaw air chuck. One jaw nests the part, the second jaw compensates for any irregularities in the piece*

Third Tool Position—The external thread is made with a 1¼ in. Landmatic diehead. The thread is a Class 2 fit. Tungsten high-speed-steel chasers are used.

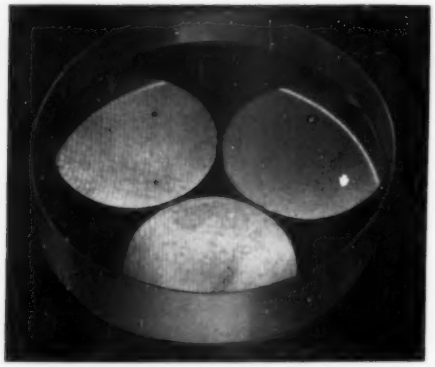
Fourth Tool Position — Generate the 15° valve seat with a slide tool that has a taper cam attachment, pushed by a stationary pin on the rear cross-slide. Cutting tool is Grade 905 Carboloy.

Fifth Tool Position—Finish face for metal-to-metal seat at 340 rpm, using a 0.006-in. feed and a 5-sec dwell. Grade 78B Carboloy tools are used.

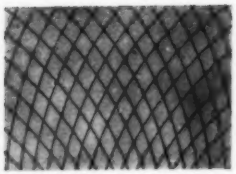
To sum up, the machining of stainless is much less of a problem than is commonly suspected. Our studies have proved that most of the difficulties encountered in the machining and threading of stainless bar stock and castings arise from attempts of shop personnel to apply "know-how" obtained from the machining of other metals. In our company we find it advisable to hire trainees who have never before worked in a machine shop. Hence, our training program does not have to overcome habits based on past experience which may interfere with the handling of stainless steel.

HOW TO OVERCOME POOR THREADS IN STAINLESS

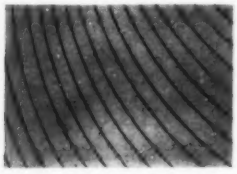
CONDITION	PROBABLE CAUSE	REMEDY
Torn threads	1. Insufficient side tooth clearance on chaser or taps.	Use interrupted chasers and taps.
	2. Insufficient chaser holder clearance.	Use a clearance of 0.004 to 0.008 in. between the chaser holders and the die body.
	3. Improper lubrication.	Use proper sulphur-base lubrication.
Rough flanks	Improper angle of the cutting face. Insufficient eccentric radial relief.	Change to proper tool.
Rough crests of threads	Over-sized work diameter.	Recheck turning operation. Stainless steel requires turning to 0.005 in. below thread dimension.
Torn roots of pipe threads	Insufficient lead in chaser.	Select chaser with longer lead
Rough finish and poor thread form (lathe threading only).	1. Improper positioning of cutting tool	Set cutting tool 1/32 in. above centerline of work.
	2. Setting the lathe compound at 90° work.	Set lathe compound at 30° to work being threaded.
	3. Improper type of toolholders.	Use straight tool holders (carbide-tool type) to keep front and side tool clearances at minimum.



Three steel disks taken at random from a chuck-load of 60 pieces show almost perfect flatness and parallelism under an optical flat. Usual precision grinding procedures were followed, and all parts have finishes of 5 mu in. or better and are of the same height within 0.00001 in.



Crossed wheel marks on the work surface are proof of absolute flatness if they are of equal depth and cross at all points.



Single lines indicate that the surface is slightly concave, a condition caused by the grinding wheel cutting on one side only

GRINDER PRODUCES FINE FLAT SURFACES

Optically flat surfaces with low microinch finishes can be obtained with standard vertical-spindle surface grinders by proper wheel selection and technique

BY H. F. SKILLINGS, BLANCHARD MACHINE CO.

SURFACES on production parts can be ground smooth within a few microinches, and flat within one or two light bands. Such operations regularly are carried out on standard rotary-table, vertical-spindle grinders employing hollow-cylinder wheels. They are the same machines used in other applications with different wheels to clean up castings to no exact size.

These precision results are being obtained with full chuck-loads of production parts, not just on individual sample test pieces. They are made possible by the application of finishing techniques developed during the war to speed production of ordnance material, and improved later to meet the requirements of producers of commercial appliances for high-quality, fast production at lowest possible cost.

Flat surfaces on refrigerator seals, packing rings, pump parts, and other precision parts are surface ground to meet finish specifications of five microinches or less, and flatness requirements measured either in ten-thousandths of an inch or with optical flats. Some users of rotary-table vertical-spindle surface grinders require, in regular production, finishes of 2 mu in. rms, or better.

The No. 11 Blanchard, grinding hardened steel, has produced finishes as fine as $\frac{3}{4}$ mu in. rms, measured by the Profilometer; and pieces as large as 5 in. in dia have checked within 0.00001 in. for flatness. These finishes were obtained with specially selected wheels used under carefully controlled conditions. But it should be noted that good finishes, from 15 to 20 mu in. rms, can be obtained with coarse wheels if the proper operating procedure is carefully carried out.

Expensive lapping operations can often be eliminated when such precise surfaces are obtained with the surface grinder. In fact, a number of manufacturers of precision parts have abandoned the practice of surface grinding to within a few thousandths of required size, then lapping to finish. One manufacturer of refrigerator parts, for example, is surface grinding large quantities of parts, in regular production, to surface accuracies of 2 mu in. rms or better. The best surface previously obtainable on these parts with lapping equipment was approximately 4 mu in. Stainless steel quality comparison blocks are regularly ground on a No. 11 machine to carefully measured ratings of 2, 4, 8, 16, 32 and 64 mu in. rms. Few users of surface grinders ever need to hold more than one or two surfaces to such close specifications, but the same techniques apply whether one or many different parts are required to be finely finished.

Procedure for precision surface grinding is not difficult. A good operator can become proficient in a

short time. The quality of finish depends upon four factors: material and hardness of the workpiece, accuracy and cleanliness of the machine, rate of work speed and wheel feed, and the wheel employed. It also depends upon the skill of the operator during the critical sparking-out portion of the grinding cycle.

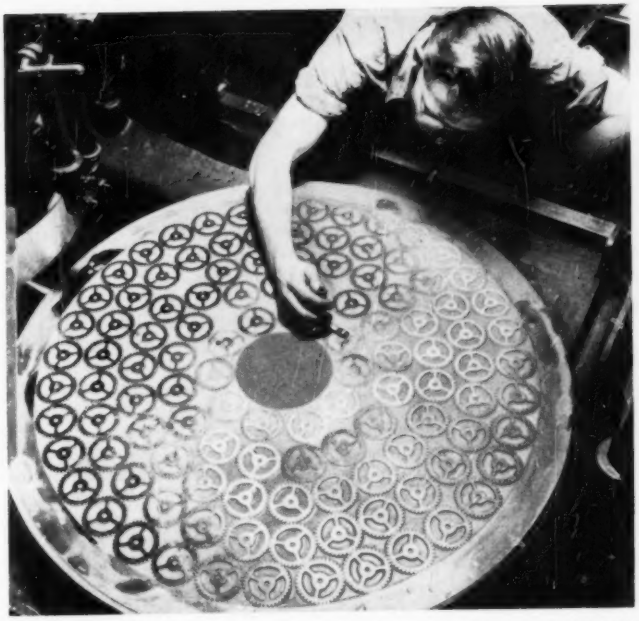
Hardness Is Important

Area of surface being ground, the material from which the workpiece is made, and its hardness, affect the finish obtainable. Hard steel surfaces can usually be finished to 2 mu in. rms or better if desired, while soft steel and cast iron seldom can be finished finer than 5 mu in. Finishes finer than 10 to 12 mu in. rms are difficult to obtain on brass, while aluminum surfaces seldom can be finished finer than about 15 mu in. rms.

To produce truly flat surfaces, the grinder head is adjusted to show a cross wheel mark when the work is finished. The presence of these two sets of criss-crossing curved marks, if they are of equal depth and cross each other at all points, is proof of flatness of the entire surface if tests show any portion of the surface to be flat. Likewise, if all workpieces in a chuck-load show these marks, and one piece is shown by tests to be flat, it is certain that all of the parts in that particular lot are flat within the same limits.

For finely finished, precisely flat surfaces, the machine must be in good condition, and must be cleaned of all loose abrasive grains and other foreign material. In addition, the magnetic chuck must be ground flat with a finish showing the criss-cross marks of a truly flat surface. If the top surface of the chuck is not flat, the workpiece surfaces will not be ground flat. Best practice, when much fine finishing is to be done, is to reserve one machine for finishing. Other machines are used for grinding the surfaces to within a few thousandths of required size, and the parts are transferred to the finishing machine for final sizing.

Grinding must not be hurried. Wheel face should be dressed sharp, wheel pressure must be light, and worktable speed selected to suit the wheel and the work. Selection of the proper grinding wheel is essential. Grits from 80 to 220 are used for fine finishes. In general, the silicon carbide abrasive, being the most friable, is the best grain to use irrespective of the material being ground. However, for some materials, the brown unrefined



Steel print wheels, SAE 1010, for business machines, are finish ground to ±0.00025 in. Stock removal is 0.009 to 0.013 in. on each side. Chuck holds 113 parts, and 226 parts (452 surfaces) are completed on both sides each hour. Retaining ring keeps parts on surface of magnetic chuck

Mating surfaces of two halves of a CI milling machine universal saddle are surface-ground flat and parallel with the ways within 0.0003 in. Pair of saddle halves now requires 50 min grinding time. Scraping two surfaces together previously required 11 hr

aluminum oxide or the white highly refined aluminum oxide in the 80 to 100 grit sizes have been found to give the best results. The harder the material and the broader the surface to be ground, the softer the grade required. In the case of extremely hard materials, like the cemented carbides, sapphires, and some ceramic materials, a diamond wheel is required.

Operating Procedure

Good finishes usually can be obtained with medium grain wheels by using this procedure:

When final size is approached, continue grinding for several turns of the chuck without downfeed of the wheel. After sparking-out is completed, raise the wheel by hand from 0.001 to 0.002 in. very slowly. This will give a finish of 15 to 20 mu in. rms on hardened steel with a 24-grit wheel, or on soft steel with a 46-grit wheel.

Follow the same procedure when using a fine-grit wheel for fine finishes. A free-cutting wheel is essential, as wheels as fine as 220 grit are quite dense; a wheel too hard for the job will tend to heat the work, and will not produce the results possible with a freer-cutting wheel. With wheels of 100 grit or finer, use the regular wheel dresser occasionally, if necessary, but with only light pressure. To give best results, dress with a silicon carbide stick, holding the stick against the face of the wheel as it idles down to a stop. Round the inside and outside corners of the wheel to about 1/16-in. radius to obtain the best finishes and eliminate occasional scratches.

When grinding large steel plates which must be accurately flat and parallel, it is good practice to raise the wheel just before size is reached, dress it, then feed the wheel down to the work by hand, removing 0.001 to 0.002 in. stock from the plate and leaving a criss-crossed marking over the entire surface. The crossed wheel marks will indicate that there are no low spots in the surface, and if the magnetic chuck has been ground flat, the sides should be parallel after both sides have been ground in this manner.

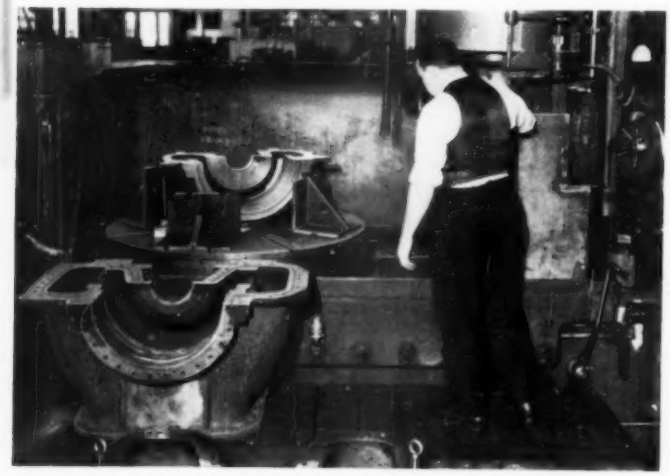
If a large plate is ground in a location which is off-center on the magnetic chuck, the above procedure should be used. In addition, if the plate is of hardened steel or a hard, tough alloy, two diagonal lines should be "coppered" on the plate, connecting the extreme corners. Then, after the wheel is dressed, the surface is ground lightly until the copper is removed from the entire surface when the wheel just barely touches the work. Copper sulfate crystals dissolved in water with one or two drops of any acid makes a good coppering solution.

When using wheels of 46-grain size or coarser, use downfeeds of 0.012 to 0.036 ipm, depending on the material being ground and the area of the surface. Coarser-grit wheels for softer material will allow more rapid downfeed rates, but when finer-grit wheels are used the rate of downfeed should be reduced. Table speeds of 18 and 25 rpm on the No. 18 Blanchard grinder, and 15 and 24 rpm on the No. 11 Blanchard, are recommended for coarse-grit wheels. To improve the finish produced with coarse-grit wheels, the final finishing can be done with the lowest table speed. However, with fine-grit wheels, the highest table speed is recommended as the high speed allows the work to pass under the wheel fast enough to eliminate danger of overheating.

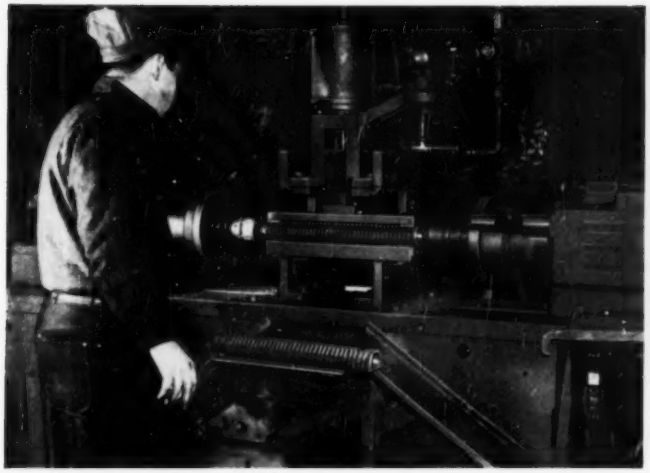
Procedure for Fine Work

When work surfaces are to be ground to very close specifications for size, parallelism, flatness and finish, this procedure has been found best:

The magnetic chuck is carefully finished flat, and checked with a straightedge. Parts are loaded around the periphery of the chuck to leave a generous opening at the center. When the No. 11 Blanchard is used, a radial width of the work to be ground of 4 in. will give good results. In the case of the No. 18 Blanchard, up to 8-in. radial width is recommended. The first side of the pieces then can be ground, using procedures outlined above. Then the pieces are unloaded and cleaned carefully. The surface of the magnetic chuck is stoned with a medium-grade India oilstone, and the chuck is cleaned. Then pieces are reloaded in inverted position for grinding the second side. Hand stoning and careful cleaning of the chuck face is important at frequent intervals to remove any burrs or bumps which may develop while handling the workpieces.



Joint surfaces on cast-steel turbine casings are finish ground to a steam-tight condition in a No. 32-60 Blanchard machine. Three sizes of casings shown measure 38 and 50 in. across corners. Stock removed from each surface averages 0.005 to 0.010 in.



Special reaming and facing machine for convector-type section. Two 5-hp heads are mounted horizontally and tooled with high-speed steel reamers and carbide facers. Air-powered clamping fixture holds the work between the heads. With work in place and clamp actuated, reaming and facing is performed automatically in about 15 sec. Chips are carried away from the operator's feet by two troughs angling away from fixture bed. Steel supports in front of operator hold the casting next to be machined

Compressed air from nozzle on worktable blows chips through section and into collector tank. Upper holes are sealed off by operator's hands, and pressure of left hand operates air nozzle. Tapped end sections are cleaned by forcing air and soluble oil through openings and into collector tank while work is held in pneumatic clamps. Oil is same as used for tapping operation

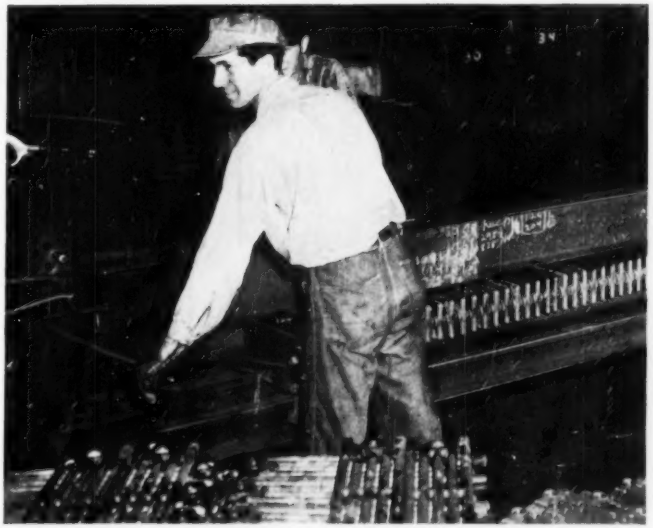
RADIATOR SECTIONS MACHINED AUTOMATICALLY

Special machines face, ream, and tap radiator castings and air blast removes chips

BY WALTER RUDOLPH

CLOSE tolerances must be held in machining tubular-type gray-iron radiator castings at the Weil-McLain plant, Erie, Pa., because as many as 100 sections may be assembled into a single radiator.

Four cored holes in center sections are reamed and faced simultaneously on a special machine. Finished sections are removed from machine and placed on a small steel table alongside the machine while another section is loaded. One edge of the table is flanged about 6 in. high, and the part rests nearly upright, ready for grasping, between the flange and a piece of strap steel. End leg sections are tapped on multi-spindle drillpress using collapsible taps to avoid reversing spindle.



Assembly of 100 or more sections is performed on a horizontal bed made of railroad rails. Counterbalanced I-beam fitted with cam clamps and held in position with end-pins holds section down while hydraulic ram forces sections together on tapered, slightly oversize nipples previously coated with rust-preventing cement. Taper on nipples and holes is 3°

SAFETY SAVES AT FRANKFORD

Despite diverse and hazardous operations, this safety program at an Army arsenal has produced a low accident rate and saved ten times its cost each year

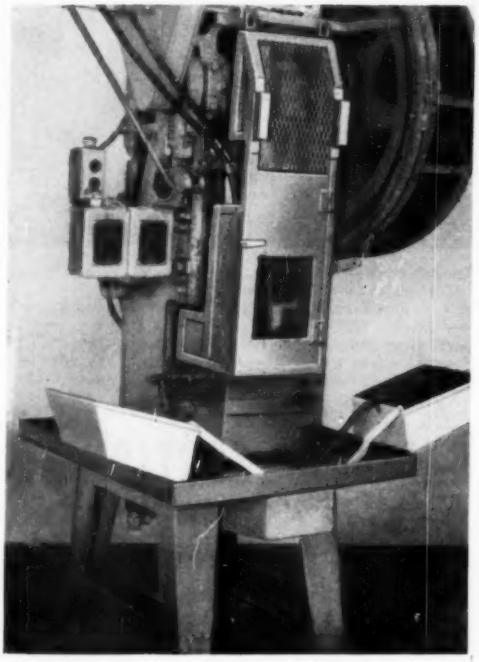
BY EDWARD A. CLARK, Safety Director
FRANKFORD ARSENAL

THIS is a time for economy to take an important place in our industrial picture. Economy, always welcome, can be news in a field where previous thinking in some areas has held that Safety is fine, but expensive. Here is our case, where returns have been ten times the investment.

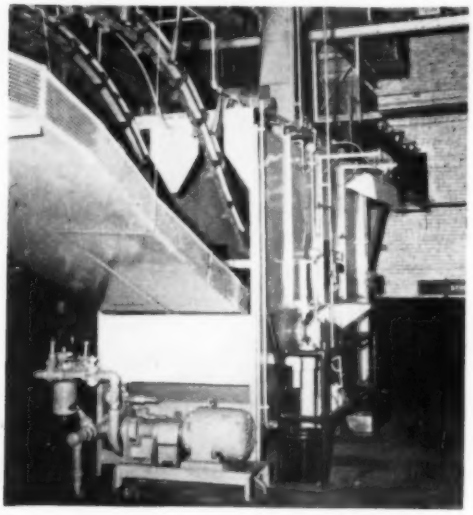
There are over 200 buildings in Frankford Arsenal, and industrial activities cover an extremely wide range of subjects, including what are commonly recognized as some complicated and hazardous exposures. Yet we have been able to make this—according to statistics—a safer place to work than around the average home.

If we have to use statistics, we can select the national average accident frequency for such exposures as ours, as published by the National Safety Council. That would be around 16.0. And what is ours, now? Around 4.0. That means our record is only one-quarter as bad as the national average. The point is not to boast about what we have accomplished, but to show what can be done.

It is hard to show this in dollars, for it is easier to show what accidents, fires, or illnesses *did* occur than *did not* occur. However, it can be shown by control sheets that such unwelcome incidents are decreasing and a unit price can be developed by the experienced safety engineer. In our experience, this adds up to the fact that $400,000 per year is being saved by an investment of around $40,000.

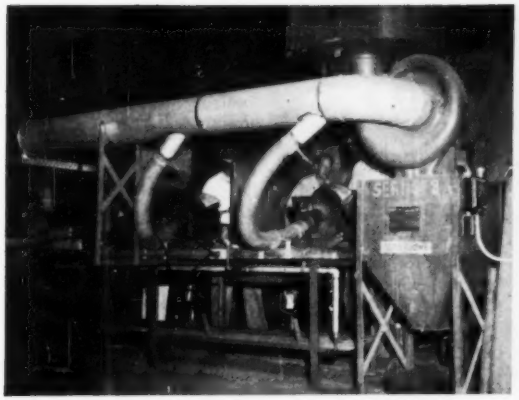


***Press for second draw** on cal .30 bullet jacket has inclosure guard around the dies*

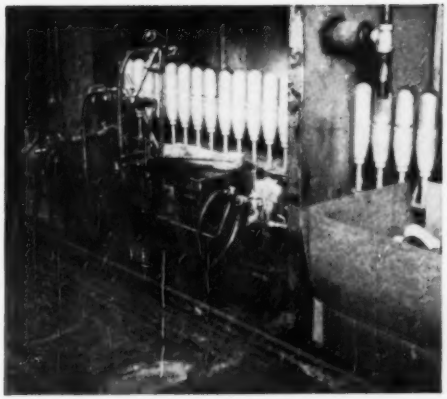


***Conveyor system** entering dip tank is protected by automatic firefighting devices. Tank is shielded and provided with local exhaust*

How was this done? Some of the steps indicated in Modern Industrial Safety Equipment (*AM*—Oct. 7, '48, p101) include protective clothing and equipment, illumination and ventilation, maintenance, machine guarding, accident analysis, and fire protection. Some other fields might include foremen's safety meetings, posters, local exhaust for toxic dusts or fumes, dip tanks, spray painting, pressure vessels, contests and awards, intra-shop inspections, safety training on pilot lines, written standard operating procedures, storage and warehousing, material handling equipment, and electrical hazards. All of these



***Local-exhaust units** provide projection while workmen are grinding the interiors of Jato nozzle units*



***Paint-spray booth** has automatic spray nozzle. Parts are carried through booth on conveyor line*

fields and several more are included in the Safety Program at this Arsenal. Examples of some of the mechanical devices are illustrated.

Some of these may not be applicable in some industries. An expert can survey a plant and determine which activities should be included to show profitable returns. Usually not enough is being spent, on the false assumption that safety is a luxury.

Were I the manager of an industrial enterprise, I would first inquire as to what was the national frequency for my type of work. Then I would go after my safety department and tell them I would not be satisfied with more than half that figure. What were they going to do about it and what tools did they need to get results?

From an administrative point of view, it is essential to have engineering personnel head up the safety program. The safety director should report only to top management, such as the vice president in charge of operations, or plant manager. Most of his decisions are in the technical field, and there should be no level of authority (such as personnel, medical, production) intervening between him and the top management. It is also essential that he act in a staff capacity, not in a position of line authority over any of the shops. He gets results by advice and recommendations, not by orders.

A concrete example of his work is the fact that the safest guard for punch or draw presses is also the one for greatest production. By showing a foreman how to thus improve his production, the safety engineer is getting his desired safety as a by-product. This is effective in those cases where old-timers "have always done it that way and nothing has happened yet."

In our ever changing and expanding industrial picture, it is important that those charged with safety responsibility keep up to date on the trends and technical solution to their problems. Management should be aware that no two days are alike for the safety engineer. His versatility in many engineering fields is an important asset. Today he may be inside a compressed-air tank, or in an elevator pit. Tomorrow he may be at a banquet addressing a formal meeting.

Whatever may be his current activity, if he is the right man for the job he is saving his company several times his salary.

CAN SUPERVISORS GIVE TOO MANY INSTRUCTIONS?

A PUBLICATION circulated among management and supervisors has stressed what it believes is a serious neglect on the part of many supervisors: namely, that of not giving "Bill" sufficient instruction, "of letting Bill figure it out."

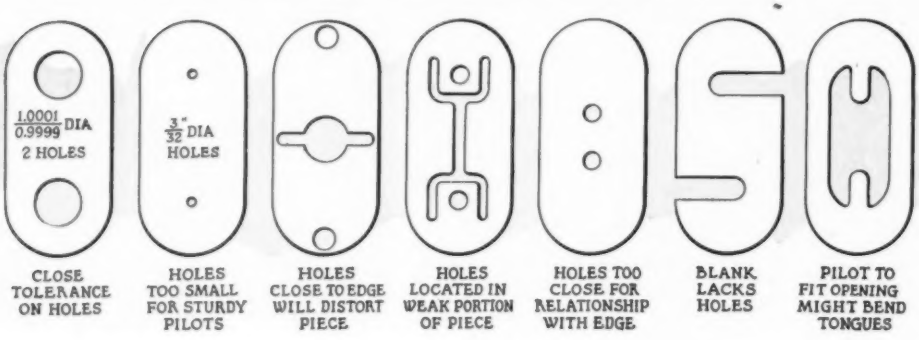
There is a lot that can be said about giving too much instruction as well as too little. I have read page after page of advice to supervisors as to how and when to give instructions, but can remember no lines of advice on when *not* to give instructions. There are times when such non-advice would get better results.

This is particularly true in the handling of highly skilled craftsmen. Most skilled mechanics take pride in their ability to figure a few things out for themselves and very often understand the details of the job just as well as the foreman, very often better.

Too few supervisors are willing to spend their time planning for the next job while "Bill" figures out the details, unless Bill goes about the job in exactly the same way they see it. They feel that, being the boss, they ought to tell him *how* to do it.

More likely what Bill needs is help in the way of proper materials on hand, progressive scheduling for the next job, a definite decision when the job is to start and finish.—*Gilbert Lindgren*, Troy, N.Y.

PART CONDITIONS THAT REQUIRE INDIRECT PILOTING


1.0001 / 0.9999 DIA
2 HOLES
3/32" DIA
HOLES
CLOSE TOLERANCE ON HOLES
HOLES TOO SMALL FOR STURDY PILOTS
HOLES CLOSE TO EDGE WILL DISTORT PIECE
HOLES LOCATED IN WEAK PORTION OF PIECE
HOLES TOO CLOSE FOR RELATIONSHIP WITH EDGE
BLANK LACKS HOLES
PILOT TO FIT OPENING MIGHT BEND TONGUES

Eight Reasons for INDIRECT PILOTING

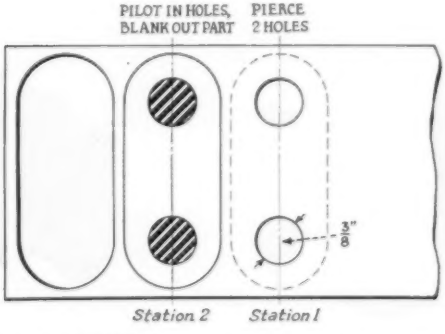
Indirect piloting costs more, but the die designer cannot afford to overlook situations where the method is essential to keep progressive dies functioning

BY J. R. PAQUIN, Tool Engineering Consultant

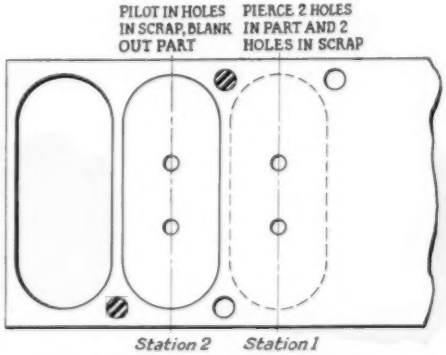
THERE are two methods of piloting in progressive dies. Direct piloting consists of piloting in holes punched in the part at a previous station. This is the ideal method for locating the part in subsequent die operations. Unfortunately, ideal conditions may not exist, and in such cases indirect piloting must be used to achieve the desired results of part accuracy and high production speed. Indirect piloting consists of piercing holes in the scrap strip and locating these holes with pilots at later operations.

There are several reasons for avoiding direct piloting. The chief one is: The stock is too thin (especially so with holes of small diameter). In fact, stock can be so thin that use of a progressive die is impractical, and it is necessary to resort to the slower compound die, despite its cost.

How to pilot is an arbitrary decision that the tool engineer must make. It is impossible to give definite rules and formulas, because the material and the hardness of the stock influence the decision. However, in the indirect piloting method, it is possible to use pilots of considerably greater diameter than might be true if holes in the part are used for piloting. The greater the diameter of the pilot, the less chance there is of distortion of either the strip or the pilot.



DIRECT PILOTING *is feasible only when the holes in the part are sufficiently large and well spaced.*



INDIRECT PILOTING *is required because the holes in the part are too small for sturdy punches.*

The second objection to the use of direct piloting arises when holes in the part must be held to great accuracy. It is possible for the pilots to destroy the hole size in their effort to pull the heavy material strip for part location.

Where holes in the part are too small, indirect piloting is required. Frail pilots introduce the possibility of pilot fracture. Piloting in the scrap strip allows the use of larger diameter and hence sturdier pilots.

When holes in the part are too close to the edges, the weak outer portions of the part are likely to distort upon contact with the pilots, instead of the strip moving to the correct position. This possibility is often overlooked in planning a progressive die, and gives rise to subsequent runs of scrap parts and expensive die alterations.

Just what constitutes a condition where the edge of the hole is too close to the edge of the part is, like many aspects of die engineering, a matter of personal judgment. Many designers use the old rule: The distance between the two must be at least the stock thickness for steel, and twice the stock thickness for more ductile materials such as aluminum or brass.

A similar problem exists when the part holes are located in a weak portion of the inside area of the part. Here, there is great possibility of the part buckling before the pilots can pull the material strip along. The remedy again is to pilot in the scrap strip with two sturdy pilots.

Put Pilots Far Apart

To achieve accurate part location, it is imperative that the pilots be placed as far apart as possible. When the holes in the part are set too close together they will not be very accurately located with respect to the outer edges of the part. Indirect piloting allows the pilot holes to be placed as close to the edges of the strip as is consistent with strength and proper strip location.

When no holes exist in the part, it is necessary to pilot in the strip. If irregular slots are punched out at a previous station, the strip must be located subsequently by pilots that enter holes pierced in the strip at the same time the slots were cut. The part is then blanked out of the strip. The pilots insure accurate location of the slots with the outer edges of the part.

The final condition that dictates the use of indirect piloting occurs when the hole in the part is of an irregular shape. A pilot might occasionally strike projections and bend them down. Hence, in such cases, it is preferable to pilot in the strip. Otherwise, the die would produce an excessive amount of scrap parts.

The foregoing conditions are danger signals to the die designer. Where any of them exist, it is generally advisable to resort to the indirect method of piloting. The method is slightly more expensive than direct piloting, because an extra set of punches must be made to pierce holes in the scrap strip.

HAS THE NATION FORGOTTEN?

Sir: Industry, government, and the nation as a whole seem to have forgotten the men who built the mechanical efficiency that the United States is famous for today! Mechanics, toolmakers, machinists, and yes, even engineers are finding that between 45 and 60+—when they should be at the prime of their experience and know-how, they are "let go" as useless. Suddenly, without warning, they find themselves walking the street, jobless. The problem of so many of these people being let out by industry and neglected by the government is very serious.

During the war most of these men came under the jurisdiction of the War Manpower Commission. They were sent, like soldiers, to any plant or area needing their services—then considered very valuable. With the end of the war, most of these warplants either closed completely or reduced their forces. Age was an outstanding consideration in the cutting process. Many of those disemployed had difficulty finding other work and the situation becomes progressively worse. Private industry will not hire them, city jobs won't go around anymore, and Civil Service—saying "Do as I say, but not as I do," sets its age limit at 60.

Bible study suggests that a man may expect that his "years will be threescore and ten." That is 70 I believe. Some folks do better. A man who has worked hard likes to feel that he is entitled to a good dinner and some comfort in the evening of his life. Where is this to come from, if at 45 future security is uncertain? Today's prices and taxes have eaten up the savings of better years, which were limited by a depression. You say "But that's what Social Security is for"—so—.

I found a machinist on S.S. drawing $30.31 per month, a little better than minimum pay for a 40-hr *week*. Several weeks in the hospital resulted in a hospital and doctor bill. A former employer provided a few days' work to help meet expenses. The pay for this work exceeded $14.99 and he was notified by S.S. that he was not entitled to his check for the month. Another toolmaker draws less than $25.00 on S.S., with which he must eke out food, clothing and shelter. Imagine! Three biscuits a day are often his ration. He says he is hungry. Some oldtimers are not even entitled to Social Security; they must depend on welfare and charity groups for existence. These are members of a proud trade!

Congress voted itself a nice pension a few years ago. They have since voted billions for ECA. How about just a little constructive thought for the men who helped make America great?

Henry Rasmussen
Niagara Falls, N. Y.

Broach operator works machine controls from platform 5 ft above floor level. Fork lift truck feeds new parts from special hopper into double stock bin at right. Pushbutton controlled elevator at left lowers finished parts to floor. Elevator platform has two levels

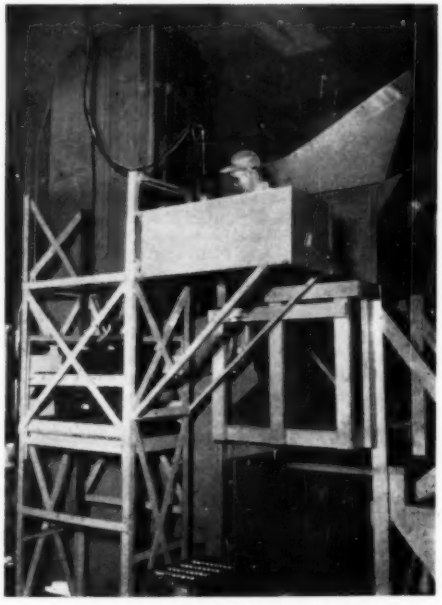
No Broaching Pit...

PLATFORM SUPPORTS OPERATOR

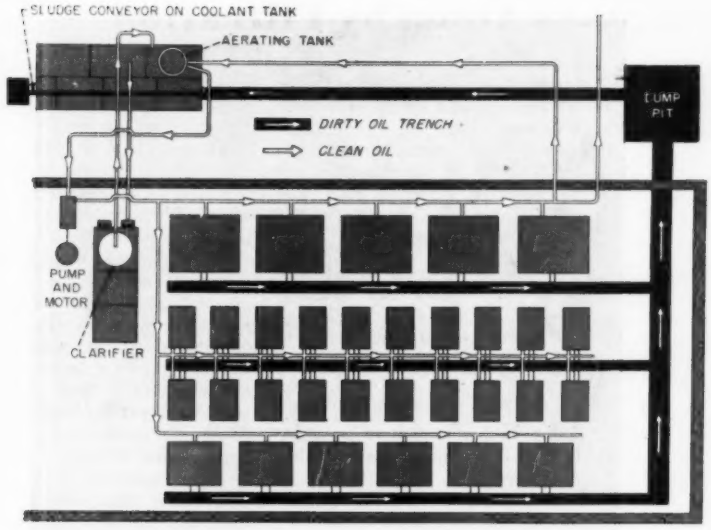
PLANT-LAYOUT alterations will *not* pose the usual machine-relocation problems for a large vertical broaching machine at GMC's Electromotive diesel-engine plant, because no pit was dug when the machine was installed. Instead, Allison engineers moved the operator's working level *up* to the machine controls and loading stations by erecting a platform, a loading chute on stilts, and a part elevator.

By
BEN C. BROSHEER
Associate Editor

New parts are gravity fed by divided bin into operator's reach. One bearing block and one bearing cap are broached at the same time to provide even output flow. Left-hand chute delivers blocks



Tote-box elevator is supported by ¼-ton overhead hoist that also handles broaching bars when they are being changed. Conveyor section behind guard holds boxes until they are moved to elevator



***Standardized filter hook-ups** are frequently adaptable to the need of individual machines or departments. According to its nature, the filtering equipment can be placed on or adjacent to the machine, on a different level, or at central location*

What Filtration Can Do For You

BY RUPERT LE GRAND
ASSOCIATE EDITOR

SUBJECT INDEX

- **Process Applications**
- **Materials Filtered**
- **Types of Filters**
- **Location of Filters**

IN THE FIELD of coolant filtration alone, there are at least ten reasons why the process is important to metalworking plants. Now that operating costs are at an all-time high, the primary reasons for considering filtration are: (1) reduction of high maintenance costs and (2) reduction of equipment downtime. These two reasons for installing coolant filters are of about equal importance. It is fruitless to argue which produces the greater savings.

Other reasons for considering coolant filtration are:

1. Reduction of rejects
2. Improved work quality
3. Extended tool life
4. Reduced wheel loading
5. Conservation of coolants, etc.
6. Minimized waste disposal
7. Elimination of one cause of dermatitis
8. Promotion of plant cleanliness.

But filtration is not confined to coolants. Other important and growing applications are parts-washing oils, lubricating oils, hydraulic oils, even quenching oils and paint. It will be found that the savings to be realized may well amortize the cost of the equipment in 18 months or less.

A SPECIAL American Machinist REPORT TO THE METALWORKING INDUSTRIES

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Processes Aided by Filtration

Data Required for Analysis of Filtration Problems

1. Types of coolants or oils
2. Viscosities
3. Flow-rate requirements of equipment
4. Quantities of sludge, chips or contaminants to be handled
5. Maximum particle size that can be tolerated
6. Layout of department
7. Installation and maintenance costs of central systems versus filtering units on individual machines.

Machining—Coolants wash small metal chips and abrasive particles into sumps or settling tanks. If the particles would remain there, filtration would not be important. But these contaminants take varying periods to settle out, depending on material and fluid viscosity. And hence a good portion of them is recirculated to increase tool wear, to load wheels and scratch work.

Filtration is more important with some machining processes than others. When soluble oil is used, filtration reduces tool wear about 15% in ordinary drilling, and as much as 50% when drilling on screw machines. In grinding, it is necessary to get rid of the great quantities of sludge formed with some operations. Also, filtration cuts down wheel loading and pick-up marks.

When cutting oils are used, filtration becomes more important because of the longer times required for chips and abrasive particles to settle out of suspension. Filtered oils have been found desirable and usually essential with broaching, burnishing, lapping, honing, thread grinding, thread rolling, gun-barrel work and screw-machine work.

It is impossible to specify particle sizes that can be tolerated for various operations. And certainly no one can state in advance what maximum particle size can be tolerated in order to obtain a certain degree of surface finish. The shop man must state what he needs in finish quality, and it is up to the filtration people to provide suitable equipment.

Certainly filtration is not a matter of removing the chips that can be raked or screened out. Here are some particle size ranges that have been required:

Mirror finishing—a particle size of ½ micron (one-half millionth of an inch).

Broaching—5 to 10 microns.

Honing and lapping—2 to 5 microns.

Thread grinding—3 to 5 microns.

These values are not to be specified by the reader, because they are related to specific operating conditions and job requirements. These matters, plus production rates, types of metal being processed, nature of the chip or sludge, viscosity of the coolant and presence of contaminants must all be known by the filtration engineer.

Press-Working of Metals—Many presses (also machine tools) are hydraulically operated. Maintenance and downtime can be reduced by filtering hydraulic oils to remove the contaminants—dirt, water, oil breakdown products, etc.—which cause wear, corrosion and sticking of pumps, valves and cylinders. Compressed air used in slide counterbalances and die cushions should also be filtered.

Heat-Treating—Most plants are forced at intervals to muck out quenching-oil tanks. Some shops are beginning to investigate sludge conveyors and filters as a means of cutting down maintenance labor, and clogging of heat exchangers.

Parts-Washing—Bearing plants could not produce a satisfactory product and without washing assembled bearings with grit-free oils. Many other plants use light distillates for between-process removal of oils, drawing compounds, etc. Without filtration, the cost of solvent dumping would be excessive.

Further details of the advantages of filtration will be given in the discussion of filtration problems of the various fluids used in metalworking plants.

What Fluids Are Filtered?

Eight major types of fluids are filtered in metalworking plants:

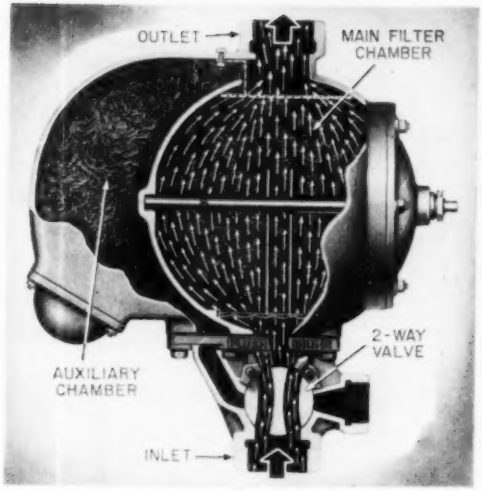
Coolants—So far as filtration is concerned, viscosity is the chief difference between soluble oils and cutting oils. Soluble oil has a viscosity nearly like that of water, whereas cutting oils have viscosities ranging from 100 to 300 SSU at 100 F. The higher the viscosity, the greater pressure drop there will be in the filter, or, conversely, the slower the flow rate. And also more viscous fluids will carry a larger percentage of "fines" in suspension for longer periods, thus requiring greater dirt-holding capacity for the filter.

The character of the chips or sludge influences the selection of the filtering medium. Small particles, say of 5 to 10 micron size, may tend to produce an impervious cake on the filtering element. In such cases, these particles may be dispersed by slurry feeding into the dirty-oil line a filter aid like a diatomaceous silica, so that the filter cake remains pervious.

Brass, aluminum and cast-iron chips create the most trouble. Cast iron produces a powdery chip, and it is doubtful that the problem of filtering cast-iron chips has been completely solved.

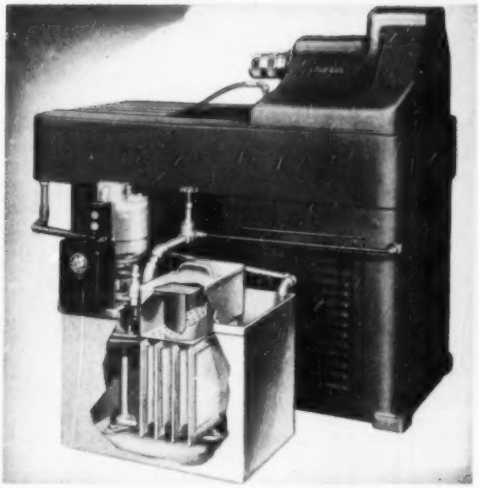
Hydraulic Oils — In hydraulic equipment, abrasive particles, oil oxidation products and water are the prinicipal contaminants. Lint, bits of packing and rust particles may also be present. Abrasive particles cannot be tolerated because of the close fits of valves, pumps, etc. Gums and acids resulting from oil breakdown create sludge.

A variety of filtering media and equipment are employed for hydraulic oils. Cellulose, felt and paper filtration media are generally used with hydraulic oils containing a rust inhibitor. Fuller's earth does an effective job of desludging



Fostoria

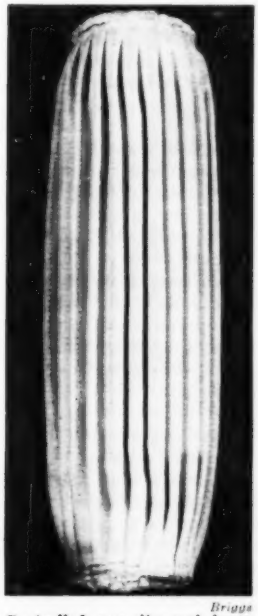
Repackable filter for soluble oil is connected to large sump. Pumped coolant flows through two-way valve, the mesh-screen, the filtering medium and out to machine. To backwash the filter, turn two-way valve left. Coolant now flows up through auxiliary chamber, down filter bed and out connection to receiving tank



U. S. Hoffman

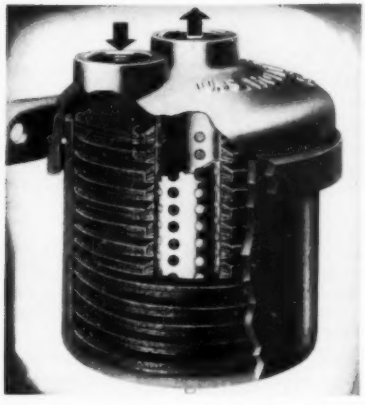
Combination coolant tank and filter units of the precoated screen type remove fine abrasive and metal particles from the kerosene-base coolants used in honing and lapping operations. The diatomaceous-earth filter aid is dumped into a precoating compartment and the equipment adjusted to draw the powdery material into the screen mesh

PRESSURE FILTERS FOR INDIVIDUAL MACHINES



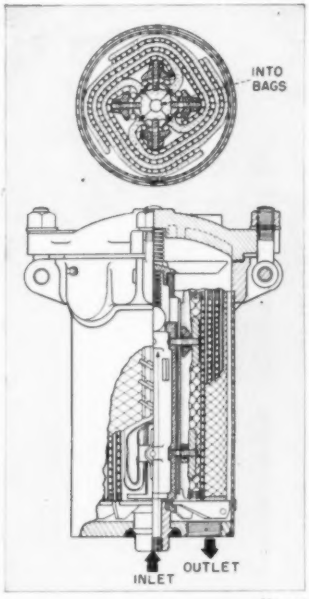
Briggs

Controlled porosity and large filtering area are combined in this pleated cellulose fill for a cartridge filter. Coolant flows through the refill, under pressure from the outside, and is taken away by a perforated-screen tube, at the center



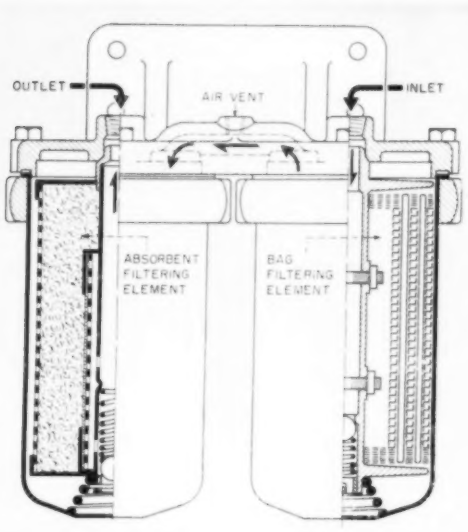
U. S. Hoffman

Disk filters are made in various ways. This one removes particles down to 3 to 5 microns, has a stack of metal screens completely covered with aircraft-quality felt or cloth. A perforated central tube acts as manifold to remove clean coolant. The same construction is used for long, horizontal filters of high flow-rate capacity for central systems



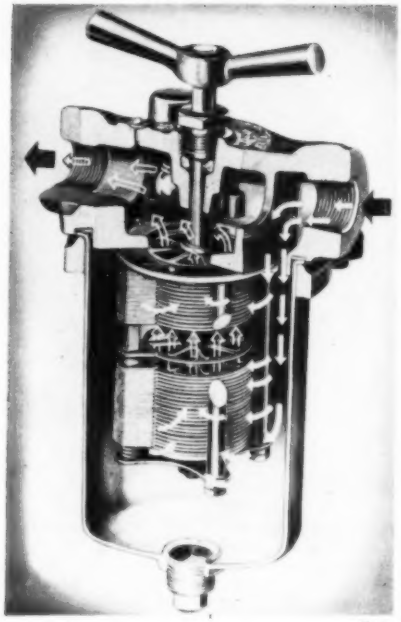
Nugent

Bag-type filters have large filtering area, high flow rates to permit 100% filtration, and are used with any liquid that will flow. Dirty liquid flows from the inlet through the central spool, out of ports into the bags. Solids are caught by the bags and clean oil flows to the outlet



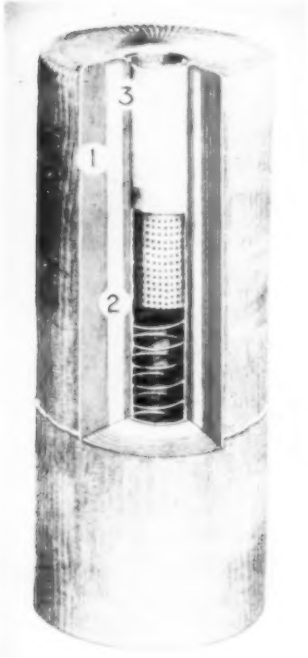
Nugent

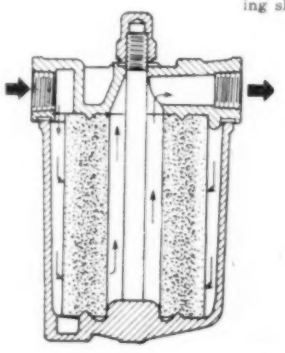
Two-stage filters are used for grinding oils when fine finishes are required. The bag-type filter catches the bulk of solid foreign matter, then the absorbent filter removes the fine particles down to 2 microns, which is a high degree of filtration



Cuno

Metal-edge filters consist of a cartridge of stacked disks separated by spacers that establish the fineness of filtration. When dirty, the cartridge is turned. Cleaner blades extending into the filtering slots comb out foreign matter





Cuno

Depth filtration is obtained with a fiber cartridge of controlled density increasing toward center, and a resinous impregnation to resist channeling and distortion under pressure. The 10-micron filter takes out all particles of that size and most of the rest down to 1 micron after a few cycles

◄— *Briggs*

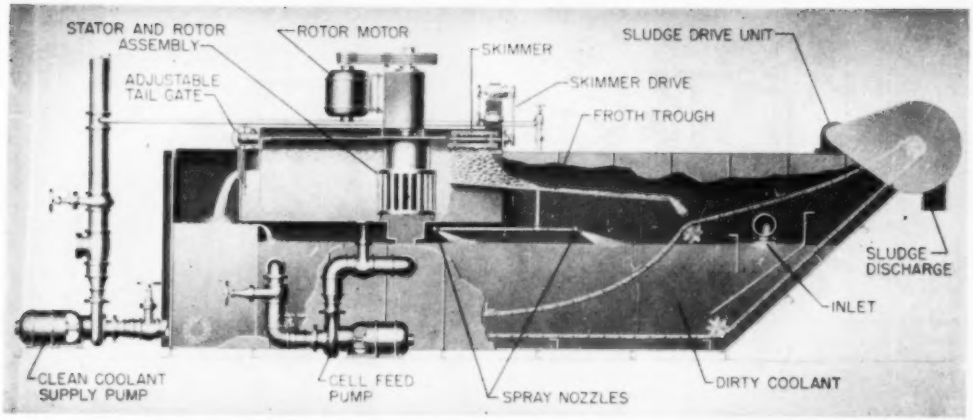
Combination filtering media are offered for hydraulic oils. An outside wrap (1) of cellulose fiber catches dirt, etc., the Fuller's earth adsorptive block (2) retains gums and acids, while the inside cellulose wrap (3) further "polishes" or clarifies the oil

straight mineral oils, but tends to remove rust inhibitors in additive-type oils. Sometimes, both media are used together in order to both filter and clarify the oil. The choice must be made after a full consideration of conditions.

Vaporizers remove water and entrained air from hydraulic oils, while oil conditioners are two-stage installations that both filter and vaporize the oil.

Filters of the disk or cartridge type can be installed in a bypass in the hydraulic circuits of machine tools and presses. Portable equipment can be employed to suck out and filter the contents of oil sumps in machines. And the centralized system is used when a number of machines use a considerable amount of hydraulic oil.

Lubricating Oils—Lubricating oils may contain abrasives, water, oxidation products, and carbon and fuel dilution, if used with engines. The filtering problem is much like that of hydraulic oils. Disk, metal-



U. S. Hoffman

Flotation units are employed to remove solids and sludge from soluble oil, except when microscopic fines must also be removed. A rotor aerates dirty coolant containing soap and a wetting agent. Bubbles carry fines to the surface froth for removal by skimming. Sludge and heavier particles are conveyed out of sump to dump trucks. These units are usually employed for central systems and handle large quantities of soluble oil

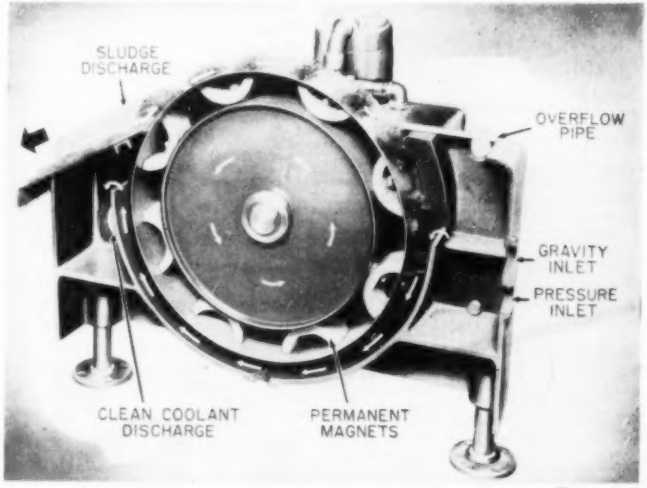
edge, and cartridge-type (cellulose or Fuller's earth) filters are commonly used. If a refining or reclaiming job is indicated, the oil is put through a filtering and vaporizing process.

Run-In Oils—Pressure filters capable of a high flow rate and of removing particles down to a very small size are required for run-in oils. Generally speaking, the engine manufacturer wishes to remove all suspended matter in the oil, in order to avoid scoring the engines.

The filtering media are usually cellulose or absorbent materials. Cellulose is adequate for filtration alone: absorbent materials are required for best results in the case of engines run in with their own fuel, in which case oxidation products may be present. Often continuous filters are installed in the full-flow line supplying a number of engines, and for this situation a filter of adequate flow rate is required. A high filtration rate is also desirable to insure rapid removal of abrasive particles.

Quenching Oils—Contaminants in quenching oils are water, scale, dirt, and asphaltenic and resinous breakdown products from the oil itself. Small quantities of water in the quench oil have been demonstrated to affect the cooling rate and hence product quality. But excessive maintenance costs for the system, especially the heat exchangers, arises when the other contaminants clog or adhere to the tube surfaces.

Many companies muck out a large sump at intervals of a week or month. But this kind of work is distasteful to labor, and efficiency gradually declines between cleaning periods. Sludge collectors have been incorporated in quench-oil tanks to remove sediment mechanically, and filters have been placed in the pipelines to handle a small percentage of the flow rate.

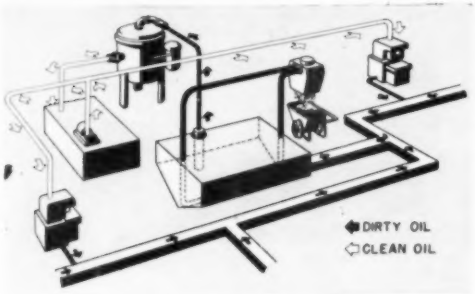


Barnes Drill

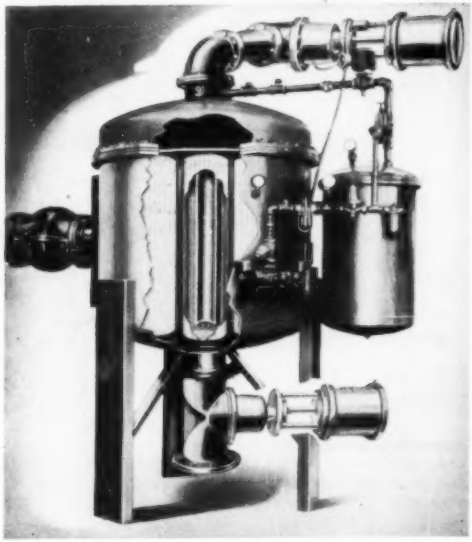
Magnetic separators filter abrasives and chips from soluble oils and grinding and honing oils by magnetic attraction. Dirty coolant flows into the restricted area near the drum backed by permanent magnets. Material sticking to the drum is scraped off and discharged to a bucket. Magnetic separators can be used at single machines or to serve a battery

Parts-Washing Solvents — Solvents (kerosene, mineral spirits, etc.) used for parts washing cost from 9 to 20 cents per gal. Many plants use these materials in large quantities. Recovery of clean sol-

PRESSURE FILTERS FOR MEDIUM AND LARGE INSTALLATIONS

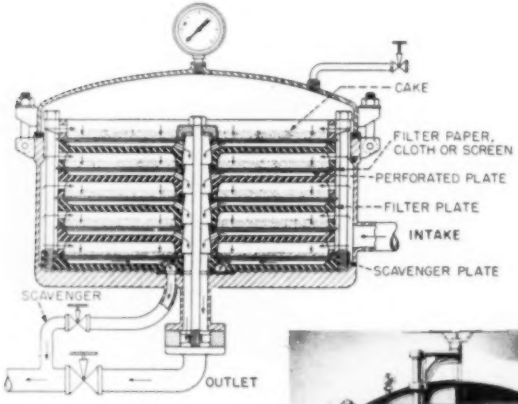


Central systems are justified when the piping cost is not excessive and the savings in maintenance and material amortize the cost in a reasonable period. Most of the filters shown here are made in sizes to cope with the needs of either central systems or several machines



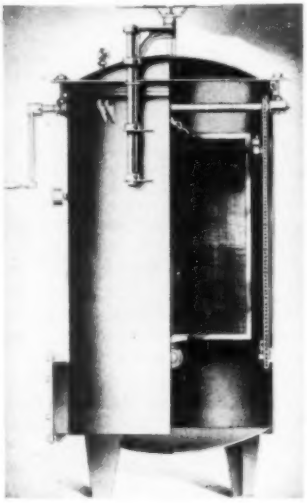
Honan-Crane

Automatic filtration and blowdown cycles are obtained with this oil clarifier (right). During filtering, dirty coolant enters from upper left, passes through screens to a header, and out the top. At blowdown, the inlet and outlet valves close, the blowdown valve opens, and clean coolant remaining in the header is blown through the dirty screens



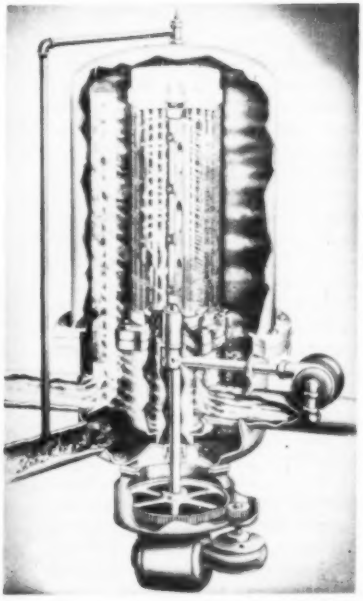
Sparkler

Horizontal plate filters (above) are usually installed in pairs when a number of machines are serviced. Thus, one filter can be cleaned while the other operates. Paper disks are normally used for small-particle filtration, and a permeable filter cake is often maintained by feeding diatomaceous earth into the dirty oil



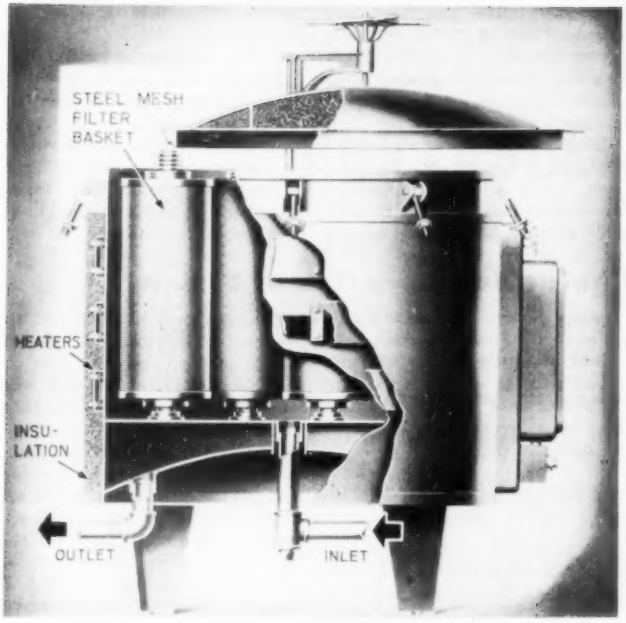
U. S. Hoffman

Honing, lapping and washing oils are filtered at high flow rate in screen-type filters. A filter aid is pumped from an auxiliary tank to precoat the screens. When build-up of particles on the screens becomes excessive, the [illegible] is turned and the cake is [illegible]ed off by a traveling blade



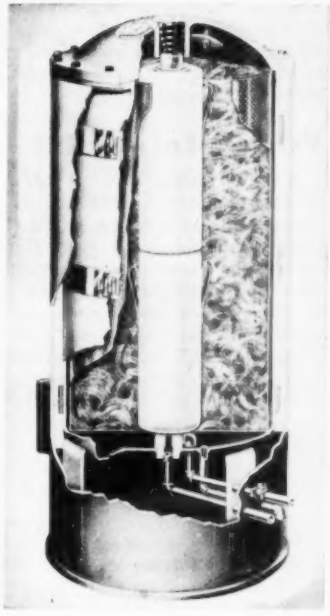
Cuno

Automatic self-cleaning (feature) is obtained by a rotating backwash nozzle. Clean coolant is sprayed back through the filter element, which consists of round wire wound into screw thread cut in a stationary cage. Spacing between the wires, or degree of filtration, is determined by the difference in pitch of the screw thread and the wire diameter



U. S. Hoffman

Multiple-cartridge filters are used where high flow rates are required, as in central systems or for batteries of machines. Cartridges may be the repackable type (Fuller's earth or cellulose) or the throw away variety filled with waste or cellulose. Materials filtered are cutting oils, quenching oils, hydraulic oils and bearing oils



Honan-Crane

Two types of filtering media are used in this oil purifier in order to cope wtih high sludge loads in cutting oils, grinding oils and quenching oils. Chips and abrasives are caught by cotton waste, oxidation products by Fuller's earth cartridges

vent is essential from the cost standpoint alone. But, also, it is often against local ordinances to discard such wastes.

Use of throw-away types of filtering elements for solvents is prohibitive in cost. Hence precoat units of the pressure or vacuum types are used. In the first, dirty solvent is pumped through precoated screens, which can be scraped at intervals and again precoated. At intervals of six months or a year, it may be necessary to take out the screens to remove hard grease particles clogging the pores. In the second type of equipment, the precoat filter is maintained under vacuum to prevent escape of noxious fumes.

Vacuum distillation is also employed to recover solvent. Loss amounts to only 5 to 10%. The savings over solvent replacement cost soon pay for the equipment.

Compressed Air—Dirt and condensate should be removed from compressed-air lines at a point just ahead of the lubricator serving portable tools or prior to the pressure reducer in the case of air gages. Never place the filter close to the compressor or the aftercooler, because entrained moisture at such points is in the form of water vapor, which will pass through a filter. Choose a filter that will not channel or collapse under air pressure.

Paint—Filters are supplied as original equipment, or installed later, on both dip tanks and paint-recirculating systems for spray booths. Contaminants found in finishes are air-borne dust, dried paint skin, metal chips, dirt from improperly cleaned work, and lint from gloves and wiping rags. For autos and machinery, the largest permissible particle size is usually 0.008 in.; for metal furniture (thin coat) about 0.0035 in., and for refrigerators about 0.0025 in. Metal-edge, backwash screen-type and horizontal-plate filters are used.

Plating Solutions—Precipitated metal salts and other impurities should be removed from plating

Acknowledgment...

The editors of American Machinist wish to express their appreciation to the following companies that supplied information for this Special Report:

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Cuno Engineering Company
Fostoria Pressed Steel Corp.
General Filters, Inc.
The Hilliard Corporation
Honan-Crane Corporation
Wm. W. Nugent & Co., Inc.
Oliver United Filters, Inc.
Sparkler Mfg. Co.
Strainer Products Corp.
U. S. Hoffman Machinery Corporation

solutions in order to improve the quality of plated ware and to avoid blemishes. Both horizontal-plate and sealed-disk filters are available for this work.

Filter Materials

It will be evident from the illustrated equipment that filtration is accomplished by a variety of principles and media. In general, three types of contaminants must be considered: abrasive particles—metallic or grinding-wheel grain, fibrous materials such as lint, and gums and high-viscosity liquids, which distort under pressure to slide through an orifice. Usually the first two types are caught by the fineness of the orifices provided by bags, cellulose and fiber cartridges, disks of paper or fiber, screens, exactly spaced metal disks or wire, and magnetic separators. Also fine particles can be removed by flotation.

Often screen-type equipment is employed to handle high filtration loads. Here a precoat material (diatomaceous earth) may be used to build up a filter cake that restrains the particles and disperses those likely to "plaster" the screens and stop filtration prematurely.

Fuller's earth has the power to adsorb oil-breakdown products and many additives or inhibitors but usually not sulfurized additives in cutting oils. Cellulose fibrous filters may be used prior to the adsorbent to catch minute metal particles in the coolant.

Choice and Location of Filters

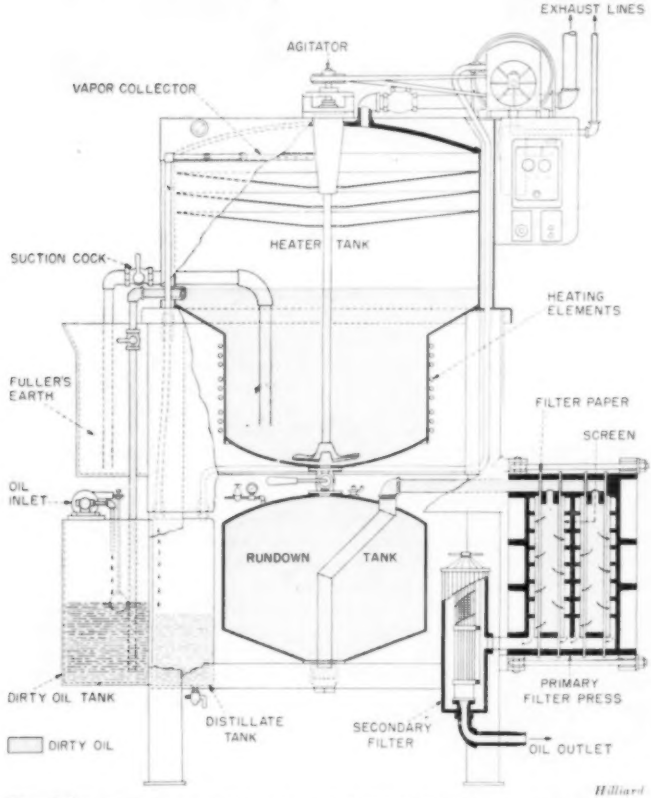
In any case, the choice of filtering equipment must be a compromise between the best type of filtration possible and what the user can afford. And you will find that there is no general agreement in the filtration industry.

If coolants are to be filtered, the engineer must know the size and shape of the chips and also the particle distribution in the fluid. The physical nature of the chips establishes: (1) type of filter, (2) optimum filter opening, (3) characteristics of the filtration medium and (4) the need for conveyors and settling tanks. Certainly, an adequate settling tank is the mainstay of a good system, because it reduces the load on the filters, and the sludges so collected can be removed by conveyors.

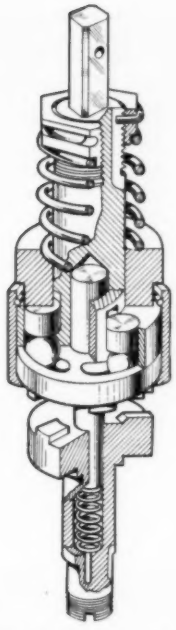
Costs are very important in planning filtering systems. By far the largest number of machines are served by individual filters. This is true because machines use diverse coolants or the cost of piping a central system is prohibitive. However, the maintenance of smaller filters can be higher.

A good compromise in many instances is to use one filter of adequate size to serve a group of similar machines.

The cheapest method of handling large volumes of the same kind of coolant, oil or other fluid is by means of the central system, provided the cost of piping will permit. Maintenance costs are lower with the central system. However, in case of breakdown, all processing machines tied to it are affected. That is the reason why some concerns prefer to couple smaller groups of machines to a semi-central system, where two filters are used. If one breaks down or needs to be cleaned during a work period, the second filter will be kept in operation. Usually, filtration engineers work out their recommendations so that maintenance can be done in periods other than production shifts.



Re-refining on a batch basis restores industrial oils but removes inhibitors. These must be added to the refined product. Dirty oil and Fuller's earth are drawn into a heating tank by vacuum, where the volatile impurities are vaporized. The remainder is dumped into the run-down tank and thence pumped to filters to remove the Fuller's earth and adsorbed impurities, plus any other foreign matter that may be present



Double-cushion clutch, showing arrangement of the single positive dog clutch and the ball-type second clutch which releases when predetermined torque value is reached.

How to Choose and Use PORTABLE TOOLS

PART 4

• • • STANDARD AND SEMI-STANDARD TOOLS

A wide variety of standard tools is available, but many operations can be performed better by semi-standard tools which are easily obtained

BY H. P. BAILEY, PRESIDENT, THE ROTOR TOOL CO.

CHANGING over from hand to power screw driving necessarily involves time and effort and may even lead to changes in the types of screw heads. Manufacturers of portable tools provide a variety of screw-driving and nut-setting attachments, and some experimenting may be necessary to get exactly the right type of clutch and the exact bits and finder for most efficient operation. When the job is done on an assembly line or production basis the type of tool is fixed; but it is possible for smaller companies to use tools with adjustable clutches which can be varied from job to job, thus enabling one tool to cover a wide variety of work. The starting point of the approach to screw-driving and nut-setting jobs is to decide which form of three drives to use: direct drive, single positive clutch, or double-cushion clutch.

In the direct-drive type, the nut socket or screwdriver bit is fixed directly to the driving spindle without any clutch. In the single positive clutch, two pairs of dogs engage when the tool is pushed on the work, and when the nut or screw is set to the point of resistance, the clutch is disengaged because of a slight angle on its faces. In the double-cushion clutch, one clutch is a single positive clutch as described above, the other is either a second dog clutch or a three-ball clutch which releases when the tool bottoms or when the screw or nut is driven home. With direct drive, there is torque reaction when the tool drives the screw or nut home; with the single positive type, there is less reaction, but on heavy work the action of the clutch is felt in the hands of the operator; with a double-cushion clutch there is no noticeable reaction.

Manufacturers of portable tools have found it difficult to explain the different approaches to screw driving and nut setting in their catalogs because of the number of variables encountered. In practice, however, if one bicycle firm has cut its assembly costs 60% with power

Heavy-duty air drill weighs 30 lb less than a corresponding size of electric drill, has minimum speed drop under load, is easier and more convenient to handle, and increases output 75%

Air-driven nut setter effectively replaces the manual tightening of bolts and gives a fixed torque value

tools, another bicycle concern can use just about the same type of equipment and realize approximately the same savings.

Drilling and Reaming

A field which is seldom analyzed closely is drilling, reaming and tapping. Larger companies, particularly in the railroad or construction field, have developed their processes over a period of years, and manufacturers have supplied an amazing variety of speeds, horsepowers, weights and attachments, because it is necessary to have the tool exactly right for all-day production. If only a little miscellaneous drilling or reaming is done the matter is not important, but if there is any production work, both the time and the ease of the operation become important. Modern drilling is done with high-speed drills running at 100 fpm, and in the case of smaller drills, at much higher speeds. It may be said that the variety of equipment in this field is at least twice as extensive as it was before the war, ranging from tools weighing less than 1 lb to tools producing more than 6 hp and weighing 50 or 60 lb.

Where it is cheaper to bring the tool to the work rather than to take the work to a stationary machine, as in drilling, the weight of the tool should be studied closely. For example, a company was using a large electric drill for reaming 13/16-in. holes in channels and 30-in. I-beam flanges. The tools weighed more than 60 lb and had a 45% speed drop under load.

Use of an air drill reduced the weight to 30 lb and gave a much higher sustained reaming speed under load, which in turn increased output 75% and changed the job from one not desired by workmen to a satisfactory operation.

Power Screwdrivers

The possibilities for substantial increases in production through the use of power screwdrivers and nut setters is perhaps not appreciated, and relatively little has been published about this field which developed substantially during the war. The productivity of the power operation is sometimes remarkable. A manufacturer of bottle-washing machines had trouble setting up $\frac{3}{8}$-in. bolts on gripper links by hand. The spring attachment tended to bind because of uneven tightening of the bolt, and each part had 16 bolts. A medium-size air nut setter with double-adjustable clutch eliminated the binding. Torque was held to 40 to 42 ft lb, and this in turn eliminated binding of the spring loop. The operator simply fixes a part, and the nut setter drives the bolt home with accurate tension. Conservatively, this tool paid for itself in 35 working days through output five times as fast as the old way.

In another case a manufacturer of vacuum cleaners had formerly used hand screwdrivers on assembly operations. In an effort to find out if output could be improved, small 1000-rpm double-adjustable screwdrivers were put on the job. Output was more than doubled with a tool weighing less than 2 lb. The operator could drive screws with one hand, and screws were driven uniformly and to the desired tension.

Impact Wrenches

Another new development in the portable-tool field, as far as widespread applications are concerned, is the impact wrench. This is an exceptionally heavy-duty nut setter which will, in the larger forms, do work which appears impossible. The light weight and tremendous power of these tools is impressive and savings are very high. Some care must be exercised in applying these tools, as continued application of an impact wrench may actually tear off the nut, but in practice this is easily controlled when the tool is first applied to the job, by some time and adjustment from the supervisor.

Semi-Standard Tools

All manufacturers of portable tools have not only developed a standard line of tools for common operations, but have modified these tools in various ways to do semi-standard operations. For example, a standard 6-in. straight grinder may be modified into a 13-in. extension grinder with $2\frac{3}{4}$-in. cone

"Long Tom" grinder is semi-standard, but is available from most manufacturers. Extension enables it to reach to the bottom of deep holes and avoids turning work over

Sand rammers are typical of the reciprocating tools on which substantial savings can be effected by careful attention to length of stroke, weight of blow, and weight of tool

wheels. This is done by adding a special spindle housing and spindle which will give firm support to the tool. In contrast, an extension spindle screwed on a standard grinder is unsatisfactory because the extension is out of balance, the bearings wear rapidly and the tool nearly always vibrates. The special tool usually costs 15 or 20% more than the standard 6-in. grinder, but pays for itself very rapidly and often makes it possible to do otherwise impossible jobs.

Such a tool is also available from most manufacturers with up to 26-in. extension, and is called a "Long Tom" type. One shop had been using 6-in. straight grinders to clean seven holes in heavy cast spools. Even with small wheels these grinders could not reach the entire depth of the holes, and the casting had to be turned over to enter both ends. A 9000-rpm, 13-in. extension grinder with 2¾-in. cone increased the speed of the operation 40% because of the higher grinding speed and because the operator could reach all the way through the holes from one end.

General catalogs and literature of many of the pneumatic tool companies do not always show these semi-standard machines because the volume of use is low, but wherever such machines can be used the increase in productivity through selection of the right tool is very good indeed.

Other examples of these semi-standard machines may be mentioned. For example, some grinders rotate counter-clockwise for special applications. Vertical grinders are available with water feed attachments for cooling the grinding or polishing operations, particularly on stone. Small tools are available for small sanding pads, for light metal-finishing operations, and light wire-brushing jobs. Drills are available with an extension front housing for ease in handling cup-wheel wire brushes mounted on the spindle. Semi-standard small-wheel grinders have various types, sizes and lengths of front ends, various types of collets and accessory holding devices, and also 13- and 26-in. extensions. Special 45 and 90° heads are available for drills and screw driving. Tools are available with built-in tapping mechanisms. Specially designed air motors are made for drives where the explosion hazard is prevalent. Stud setters, reciprocating filing-machine attachments, ratchet wrenches, saws built into modification of standard portable tools, and many others can be had as well.

Another interesting field for the application of small portable tools is in the removal of flash and fins from aluminum and soft metal castings. These little tools, weighing from 1½ to 2¾ lb, will operate rotary files at 17,000 to 21,000 rpm, giving a smooth, easily handled job. Where volume of production warrants, they may even operate carbide files which are quite expensive in first cost but have a surprising length of life with maintained cutting efficiency.

Reciprocating Tools

It is not always realized that the same opportunities for improving production, through selection of the right tool for the job, apply to reciprocating tools such as scalers, sand rammers, and chipping hammers. Manufacturers make a large variety of chipping hammers. These differ in number of blows per min, weight of tool and length of stroke. In some cases the heavier tool will increase production but may cause damage to the work by too violent action. On the other hand, the general tendency of the operator is to pick a nice easy tool, without much recoil, which, in turn, does not do much work. For a given job, therefore, the problem resolves itself into selecting a tool which the operator will use, and which at the same time will give as much production as possible. Here the only answer is trial of several different combinations of blows per min and lengths of stroke. Once the right combination is determined, largely by trial and error, the improved results continue as long as the operation is in effect. Perhaps, theoretically, the personal prejudices of operators should be ignored, but under practical labor conditions they must be met. Even though the highest-production tool is not finally accepted by the operator, a gain of 20 to 50% in output may still be realized. Chipping-hammer operation is of necessity a rugged one. Men become accustomed to certain combinations of weights and blows per min, but much can be done to improve performance by careful study of the many styles and weights.

Foundry Applications

The same comments apply to sand rammers. One foundry, for example, stepped up production by using a rammer that gave a faster, snappier blow, and weighed 4 lb less. Control of mold hardness was improved and labor fatigue was decreased noticeably because of the lighter weight. Although savings are hard to evaluate in cases of this kind, management gave credit to the new tool for substantial production savings. In this particular case, a replacement tool was required, and by careful study of the situation, improved production was actually obtained without any additional cost. This situation often arises where existing equipment becomes worn out, or is broken or lost.

Part 5 of this series will appear in a forthcoming issue.—Ed.

GAS-SHIELDED ARC WELDS STAINLESS CUPS

Mechanized setups produce straight and circular joints that require a minimum of polishing on 14-gage steel for milker machine cups

BY CLARENCE ROOT, Shop Superintendent
MICHIANA PRODUCTS CORP.

Stainless steel teat cup (right) for a milking machine and the parts from which it is assembled by Heliarc welding of longitudinal and circumferential joints.

STAINLESS-STEEL parts for the dairy industry must meet exacting specifications. No pits or other irregularities in which dirt or microbes may lodge are permitted, and the metal itself, as well as joints, must withstand periodic cleansing without corrosion. These requirements are fully met by Michiana Products Corp. in quantity production of milker teat cups which measure about 7 in. long by 2 in. dia and are made from 14-gage, AISI type 430 stainless steel.

Because drawing such cups would be extremely difficult, the barrel is curled in a punch press to form a tube, and the separate domed head is drawn and pierced with a central and a side hole. An arc butt weld joins the edges of the curled piece to form a true tube, then the head is butt-welded to one end to complete the assembly.

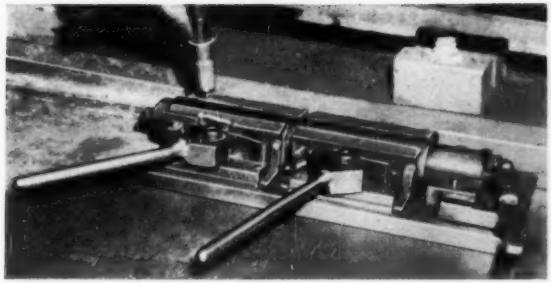
To meet sanitary and production requirements, the logical choice was the gas-shielded arc using Linde Heliarc welding equipment and argon gas. This process concentrates the heat in a small area, making welds of high quality almost as rapidly as fixtures can be loaded and positioned. While one girl at each of two machines makes the welds, two other girls unload and reload spare fixtures. These fixtures clamp the edges where joints are to be made and hold the work in correct relation to the welding electrode.

To produce the longitudinal welds, the loaded fixture remains fixed as the water-cooled torch is traversed on a carriage that moves automatically along a track. For the circumferential welds there are two torches, fixed except for striking the arcs, and the work is rotated slowly along with the fixtures. As timing and rates of motion are determined by the machines and remain unchanged, and gas flow, as well as other factors affecting the weld, are closely controlled, welds are of uniformly high quality. Operations are automatic except for starting and stopping. Both machines make two complete welds per cycle.

Welding current is furnished by dc generators at straight polarity, which is recommended for stainless steel of this thickness. The tungsten electrodes are kept quite sharp to help confine the arc to the area desired, and to keep it concentric.

For the longitudinal welds, the fixture employs a split copper mandrel adjustable by a wedge so,

Water-cooled Heliarc torch is advanced along a track on a carriage as longitudinal welds are made on two tubes clamped end to end in a fixture. Welding rod is required only occasionally at transfer point between the two parts



Welding fixture with two tubes placed end to end over an expanding copper mandrel prior to making longitudinal welds. One girl loads and unloads while another is making the welds. End lever expands mandrel; front levers operate cam clamps

Expanding fixture holds the tube and clamps the domed cap against one end by use of a wing nut. Fixture is turned slowly in the machine while a weld is made to fasten the cap to the tube

when the tubes are clamped by hand-operated cams, it bears tightly against the inner wall at the joint. This mandrel is not water cooled but is a good heat conductor and, being tightly pressed against the inside of the tube, helps to insure 100% weld penetration, to form a more ductile weld and to prevent oxide from forming inside the tube.

Two tubes are slipped over the mandrel with the longitudinal joints in line and butting end to end. This makes it possible to produce a continuous weld along two tubes, the electrode being advanced continuously at 20 to 22 in. a min. No metal is added except for a slight amount as the arc passes the point where the two tubes butt, then only if a pit tends to form there. In that case, a slender rod of the steel used in the tubes is touched to the junction as the arc passes from one tube to the next.

A small carbon rod is used to strike the arc at the start of the weld. This helps to avoid metal pickup in striking and makes it unnecessary to apply a high-frequency current.

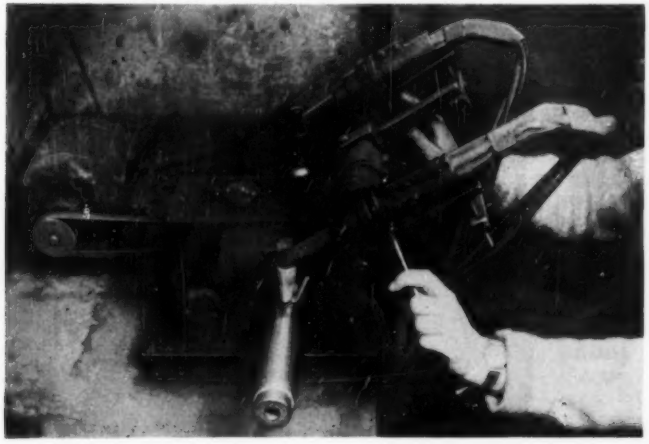
Before circumferential welds are made, the tubes are removed from the fixture and each tube, after cooling, is press formed inward at one end to produce a radius. This makes the tube ready for welding the cap to its unformed end.

The welding fixture includes a three-piece mandrel having a threaded stem which is passed through the central hole of the formed and pierced cap. A wing nut is then applied over the stem. As the nut is tightened, the mandrel expands to grip the inside of the tube and the cap is clamped against the unformed end.

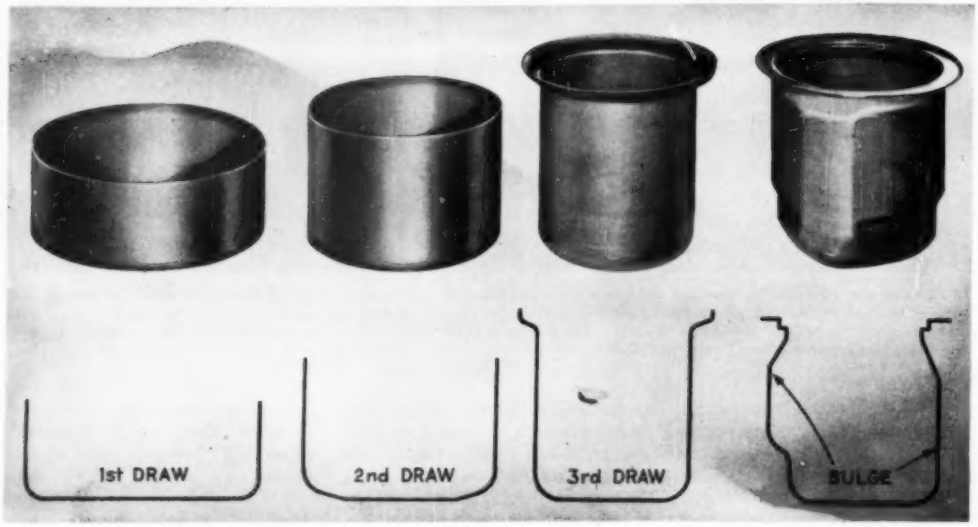
The welding machine is a motor-driven gear reducer having a slow-speed cross-shaft, at each end of which is a chuck that grips a fixture. To make the welds, two water-cooled torches are mounted in swivel supports on the reducer housing. The arc is struck by turning each torch in its swivel until the electrodes contact the work. Work rotation is continuous and it takes 42 sec to make the two welds simultaneously. Current is supplied from a 200-amp dc generator. One girl operates the machine while another unloads and reloads spare fixtures.

With these two machines, total welding time (two welds per piece) approximates 1½ min, not including loading and unloading time. Despite this high rate, welds are free of pits and are of excellent quality. Moreover, as practically no metal is added or consumed, welds are substantially flush. This helps make polishing rapid and easy.

When welding is completed, the teat cups are polished outside on abrasive - belt machines, wire brushed and given a final buff before shipment. Before buffing, however, a small nipple is silver-soldered in the smaller of the two end holes.



Circumferential shielded-arc welds are made on two parts simultaneously to join caps to tubes in this machine equipped with two water-cooled torches. Mandrel fixtures, holding parts in correct relative position, are rotated slowly by gear-reduction unit.



Cups finished in the first three draw operations, and the bulged shell, are shown in sequence and in cross-section. Annealing is not required until the blank has been ledged and made ready for bulging

DIES MAKE THAT BULGE IN COOKER POTS

Bulged sidewall of Hotpoint deep-well cooker shell is formed hydraulically in die with 2000-psi pressure from intensifier in press base

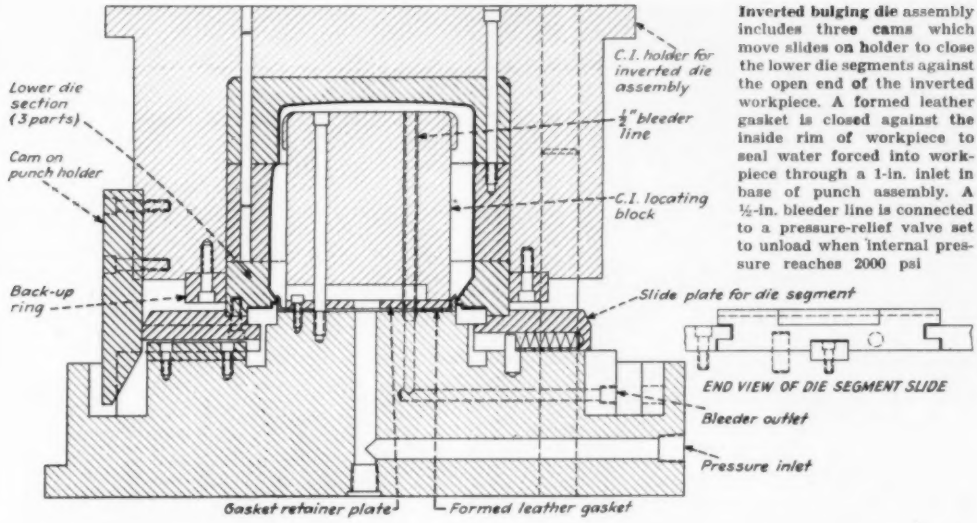
BY B. E. SCHROEDER
Vice President of Manufacturing, HOTPOINT, INC.

HOTPOINT domestic electric ranges feature a Calrod heating element which can be positioned either at the bottom of a drawn shell, under a deep-well cooker pot, or on top of the range as an extra heater when the deep-well cooker is not required. To permit adjustment of the heating element at either the top or bottom positions, it was necessary to design and produce a deep-well cooker shell with a bulged sidewall. This bulging is performed in a hydraulic die, and is unusual because the bulging is not symmetrical—there is more bulge on one side of the shell than on the other.

The deep-well cooker shell is drawn from a 3S-O aluminum alloy disk 0.040 in. thick and 21 in. in dia. Three draw operations are required to form the shell, each draw being performed in a Type CU-3 H-P-M Fastraverse deep drawing hydraulic press equipped with a hydraulic blankholder and a hydraulic die cushion in the press bed. Each of these 150-ton presses has 36x36-in. platens. Stroke of the main ram is 36 in. in each case.

The first draw shapes the round blank into a cup 12½ in. in dia. and 5½ in. deep. Pressure

Opened bulging die shows clearance provided for easy loading and unloading of workpieces, and also indicates open design of bulging punch to permit rapid entry of hydraulic fluid from bulging cylinder



Inverted bulging die assembly includes three cams which move slides on holder to close the lower die segments against the open end of the inverted workpiece. A formed leather gasket is closed against the inside rim of workpiece to seal water forced into workpiece through a 1-in. inlet in base of punch assembly. A ½-in. bleeder line is connected to a pressure-relief valve set to unload when internal pressure reaches 2000 psi

Bulging the shell is done at the rate of 165 pph in a Fastraverse double-action press equipped with an hydraulic-pressure intensifying cylinder in the base. Bulging die is inverted so that hydraulic feed line can enter through lower punch holder, thus eliminating the need for flexible joints in the high-pressure hydraulic line, and possible leakage

on ram averages 20 to 25 tons and pressure on blankholder is 20 tons. A draw die of conventional design is used.

The second draw reduces the diameter to 10½ in. dia. and increases the depth of the cup to 7 in. Pressure required for the second draw is 25 tons on the punch and 20 tons on the blankholder.

In the third draw, cup diameter is reduced to 8.437 in. and depth is elongated to 9¼ in. This requires a pressure of 40 tons on the punch and 26 tons on the blankholder. The third draw leaves a 10.500-in. dia. flange at the open end of the cup. The flange is turned down in a ledgeforming die during the fourth press operation, which is performed in a No. 88 Bliss mechanical press. This operation also grooves the bottom of the shell. No annealing operation is necessary prior to any of the first four press operations.

The drawn and ledged cup for the deep-well cooker shell now is ready for bulging. This operation imposes so much additional stress on the walls of the shell that it must be preceded by a carefully controlled annealing operation. The ledged cups are hung on the conveyor of a Detrex vapor-spray-vapor degreaser for a 12-min. cleaning cycle, then are placed on the continuously moving slat conveyor of the 790-800 F. annealing oven. Conveyor speed is timed so the individual cooker shell cups are in the heating zone for 10 min.

This annealing operation is critical. If the temperature deviates as much as 10 F. from the required range, the bulging operation is affected to the extent that a large scrap loss results.

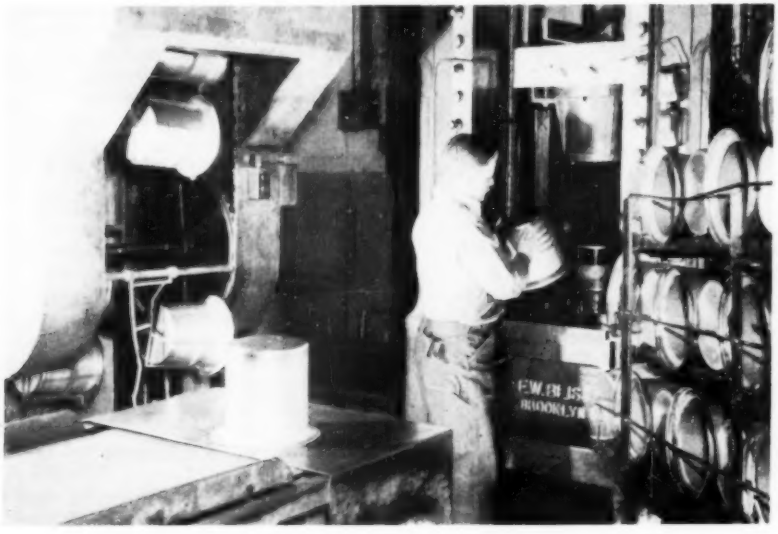
The annealing conveyor also carries the cups through a cooling chamber which controls the

Cooker-pot shells are drawn on three double-action H-P-M hydraulic presses. Rack chutes provide adequate work-in-process storage, while keeping the shells off the floor and delivering them to a position convenient for the operator of the next machine. Press time is 10 sec per operation

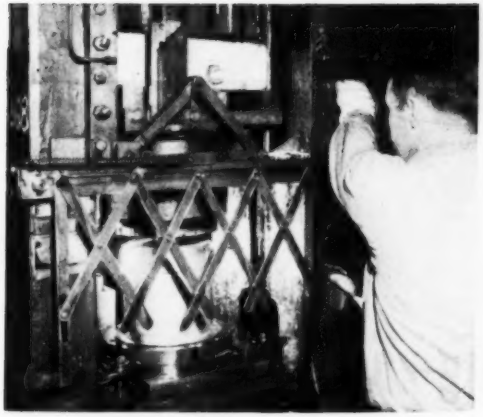
rate of cooling. This conveyor delivers the cups directly to the adjacent hydraulic bulging press, at a convenient height for easy transfer into the bulging die.

Bulging is performed in a Type CU-3 H-P-M Fastraverse hydraulic press identical in size and capacity with those used for the first three draws, but the blankholder slide is fastened to the punch slide and hence is inactive. For this operation, the main press slide exerts 100 tons pressure to clamp the shell cup in position. Then water is forced into the bulging-die assembly under 2000 psi by a bulging-cylinder attachment built into the base of the press. Essentially, this bulging cylinder is an intensifying hydraulic

Conventional deep-draw dies form the shell cups from 0.040 in. thick, 21-in. dia. 3S-O aluminum alloy blanks



After third draw, cups are transferred to inverted die in a Bliss No. 88 mechanical press, where the flange is flattened or ledged and grooves are formed in the bottom of the cup. Operator of press hangs finished shells on conveyor of adjacent Detrex degreaser. When they are returned clean, he places them on conveyor serving an annealing oven



Bulged shells are finish-formed, trimmed, embossed and pierced in the bottom in two operations on Bliss No. 85 single-crank, straight-side presses. Safety of operator is insured by guard developed by A. M. Frandsen, toolroom foreman at Hotpoint. Guard is actuated by cam on press slide, travels in horizontal track

Slot for adjustment of Calrod heating element in deep-well cooker shell is pierced, and then edges are coined in two horn-press operations. Quick location of workpiece is feature of welded die assembly. After these operations the deep-well cooker shell is ready for polishing and the assembly of spring clips by riveting

cylinder. In some cases the high hydraulic pressure required for bulging results in fractures in the walls of the workpieces, because of variations in the material and in the annealing operation. However, loss from these factors seldom exceeds 5%.

Following the bulging operation, the shells are transferred successively to two No. 85 Bliss single-crank presses where the flange is trimmed, a 2¼-in. dia. bottom hole is pierced, the flange is formed and several surfaces are embossed. Then, three No. 24½ Bliss horn presses are used to pierce the unit slot in the bulged side of the shell, to coin the edges of this slot in order to remove the burrs, and to pierce spring clip rivet holes in opposite sides of the shell.

Finally, the flange is polished in a Hammond four-wheel automatic polishing and buffing machine, the units are degreased and cleaned in a second vapor-spray-vapor Detrex No. 325 conveyorized cleaner. Spring clips are mounted and riveted on opposite sides of the shell with a tubular riveting machine.

Tips FOR TOP SHOP MEN

291 Kids enjoy surprises; grown-ups rarely do. Hence, keep those above you informed of what you're doing. Don't let your boss be in the embarrassing position of not knowing what's going on in his department—unless you're out to cut his throat. If you are, watch yours.

292 Even when you are sure your solution to a problem will work, have an extra one ready, just in case. You'll be surprised how many men are caught napping by the failure of "sure-fire" solutions.

293 When you report on anything, keep it brief. Supply details only when they're asked for. If the recipient wants more information, he'll ask. If you give him too much, he'll probably never read it in the first place.

"The guy on the left? No, he's not on piecework—just a new man who doesn't understand mass production yet."

ROUND TABLE

Paying—or Paid—Guests?

"Ed, the super asked me if I would consider taking on a couple of young fellows for the summer months."

"And naturally you stuck your neck clear out by saying you would!" smiled Ed.

"What d'you mean—stuck my neck out? If we have the work to do, I don't see what's wrong with the idea. Does good to have young fellows with ideas around."

"You're laying yourself wide open, Al, if you undertake a thing like that—they're only using you for their convenience," insisted Ed. "By the way, they don't happen to be a couple of nephews of the Old Boy, do they?"

"That I don't know for sure. Besides, what difference would it make anyhow?"

"Oh, I just got to thinking. What's the big idea of bringing in temporary help anyhow—and kids at that?"

"Well, Ed, as Mitchell was discussing the possibility of putting on a couple of young chaps, he mentioned that they were entering freshmen in an engineering course at old P. U."

"Oh, that's the game, eh?"

"Just what have you got against it?"

"Well, Al, we're running a manufacturing establishment and not a school—if we're going to put ourselves out to hire new people, why not take on a couple of youngsters who we know will stick on for several years at least? You'll find that you'll have to spend lots of time with a couple of educated dumbbells who don't know a bolt from a nut."

"That's just the point, Ed. After they have a session in my shop they'll know a little about what it's all about and will be able to appreciate more what they are heading for when they get into their engineering studies."

"So you've turned into a philanthropist, eh—playing the sucker for the college. Why should we carry the load? By the time they learn where to hang their hats and how to keep out of the way of the trucks, the summer will be over. All you'll do is pay to help somebody else."

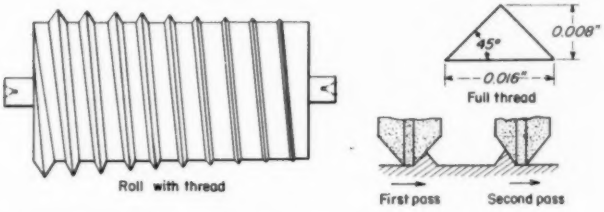
"Oh, I wouldn't say that, Ed," argued Al. "A little cooperation on our part will be a step in getting better graduates from the school; don't you think?"

"No, I don't. They'll never end up working in the shop, so what's the good?"

"Well, Ed, we may at least help develop a couple of engineers who know a little about shop problems . . ."

***CAN A SHOP AFFORD** to offer summer jobs to college students? Is it worthwhile—or just philanthropy? Your ideas and opinions on this subject can help others. Discussions of earlier topics appear on later pages.*

Practical Ideas



Disappearing Roller Thread Ground with Off-Pitch Passes

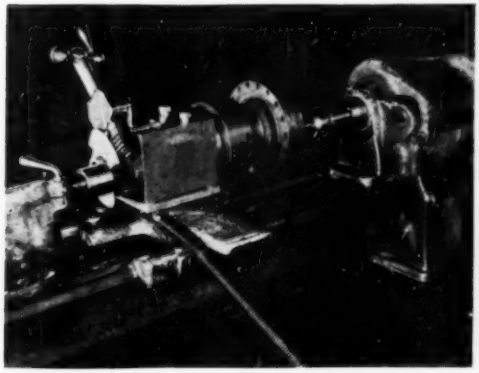
WE HAVE an interesting thread-rolling job that is done on a rolling tool for our shop. The hardened roll, as illustrated, must be ground to an external thread that increases in height from zero at one end of the roll to full height—0.008 in.—at the other end. The full width at the base of the thread is 0.016 in., and the 45° included angle of the thread must be ground sharp.

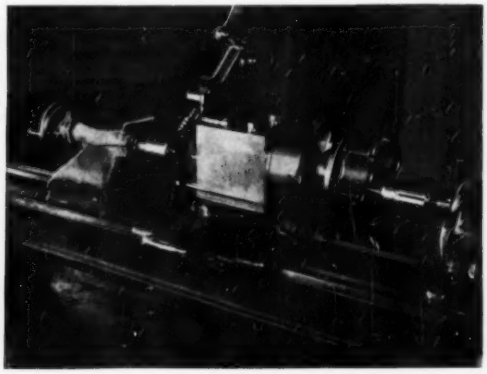
This is accomplished by grinding the two different sides of the thread at different pitches with a wheel dressed to a 45° angle on each edge. There are 10 turns of the thread over the whole length of the roll. At each turn, the thread must decrease in width of the base by a tenth of the full depth, or 0.0016 in. Therefore, the second pass of the grinding wheel on one side of the thread must cut a pitch that is 0.0016 in. less than the first pass.

The first pass is made on the left side of the thread, moving toward the right end of the roll, and the second pass is on the right side of the thread, and reduces the thread in size as it grinds. Thus, if the nominal pitch of the thread is 0.5 in., the first pass is set at a 0.5008-in. pitch, and the second at 0.4992 in. *G. Starre, Eindhoven, Holland.*

Reversed Drillpress Spring Adds a Hand for Tap Work

A LITTLE TRICK I discovered for tapping holes when an attachment is not available is to reverse the tension on the return spring. This reverses the vertical motion of the spindle, and forces the tap into the work. Then I hold the work with one hand and pull the power belt with the other to get the tap started. Once started, the tap is fed down by the spring automatically. Normal switch timing stops the tap so it doesn't hit bottom. *C. Primdahl, Chicago, Ill.*



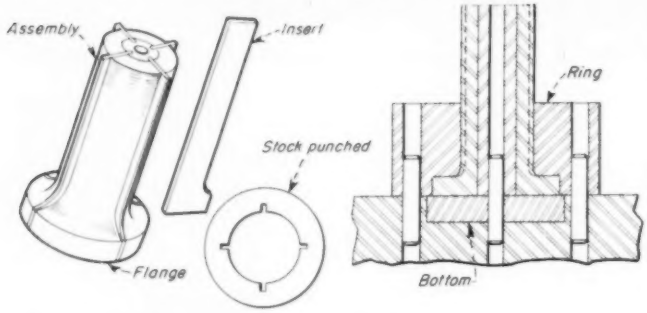


Lathe Mills Face Cam With Spring-Loaded Templet

RECENTLY we milled a face cam in a setup on a lathe. This turned out to be faster than a universal-milling-machine job, and was accurate enough for the moderate tolerances specified.

The end mill was held in a drill chuck. On the lathe compound we mounted a dividing head with a templet of the required groove shape clamped on the rear of the indexing spindle. A chuck attached to the head supported the cam casting. Cross-feed was disengaged, and a heavy tension spring was fixed between the slide of the lathe and a heavy, bolted-down cabinet to the rear of the lathe.

In contrast to regular contour-milling operations, the stylus was stationary while the work and dividing head moved. The rotating templet rested against the stationary stylus, held there by the spring. The stylus was, in this case, a ball-bearing type fitted in place of the regular center. *Heinz M. Landauer, Tampa, Fla.*

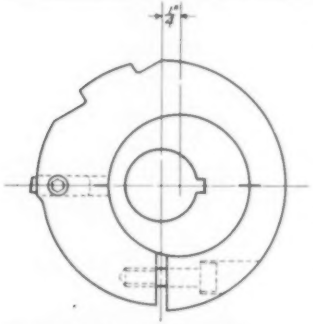


Corner-Grinding Troubles Avoided with Sectional Punch

Irregularly shaped holes to be pierced may have sharp internal corners. These cause some difficulty during the grinding of the punch, and if special grinding equipment or a wheel dresser are not available, a change in the punch may be necessary.

The main body of a punch we made to pierce round holes with four square notches was slotted, and four hardened and ground inserts were added. The parts were formed with a flange and fitted inside a ground ring in the punch assembly. The ring was screwed and doweled into the die shoe, which was recessed for a hardened button to take the thrust of the four inserts. The bottom of the button bore on the die shoe.

Corners of the inserts were easily ground square, and the punched hole fitted dimensional and shape requirements. *Cliff Bossman, Dayton, Ohio.*



Eccentric Cutter Mounting Provides Various Radii

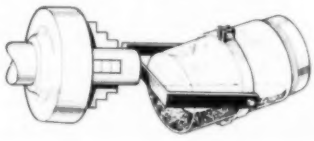
ACCURACY to within two thousandths in holes ranging in diameter from 1.85 in. to 2.50 in. was obtained with a boring tool which had to be mounted on a large mill.

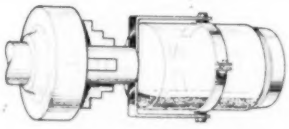
Two 1-in.-thick disks formed the single-point tool support, which was keyed to the machine arbor. The inner disk was bored and slotted to fit the arbor, and was turned to a 2-in. OD which was ¼ in. off center. The outer disk, bored to a 2-in. ID and was turned to a 3½ OD, also ¼ in. off center. The outer disk was cut back in front of the bit hole for extra chip clearance and was split for clamping by a capscrew. The bit was held in the outer disk by a setscrew.

Two notches in the outer disk were cut to provide surfaces which could be hammered to rotate the outer disk on the inner one to alter their relative positions and the radial setting of the bit. With the disks set as illustrated, the smallest radius was bored. A 180° reversal of their positions provided the largest radius, for which the bit had to be extended from its first projection of about 0.1 in. to 0.25 in. Index marks helped in locating the tool by showing the maximum- and minimum-radius positions. *W. Francis, West Bridgeford, England.*

Miniature Tumbling Barrel Installed in Lathe Chuck

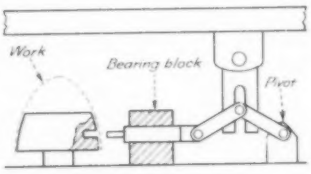
SMALL PARTS can be tumbled to remove burrs with a simple setup on a lathe or any machine chuck with a horizontal axis. The barrel is a fruit jar, which permits inspection of the parts without removal.





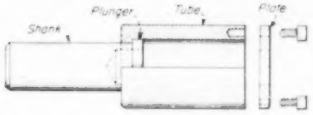
A yoke is welded to a round shank which is chucked. A strap clamps around the jar and fastens to the yoke. This can be set at an angle to the axis of the machine so the parts are rotated and also slide from one end of the jar to the other.

Powdered abrasive mixed with water is the compound, to which can be added a little soap for final bright finishing. *L. Kasper, Philadelphia, Pa.*



Toggle Replaces Cam For Side-Piercing Job

SIDE-PIERCING DIES can be made with toggle actions instead of cam actions, and can be built cheaper and in any small shop. The illustrated mechanism pierces holes in the sides of cups with little wear in the linkage and is powered directly by the upper platen of the press. The slot in the vertical member can be located so as to require only a short stroke of the press. *Chris Sorenson, Racine, Wis.*



Cylinder Holds Washers For Multiple Boring

A WHILE AGO a rush order came through the shop for a batch of washers that had to be bored, for accuracy. Instead of chucking them one at a time, I made a cylindrical holder that was chucked.

The tube was bored to the OD of the washers, and was fitted with an end plate which was held with capscrews to clamp 50 washers at one time. The shank was fitted with a plunger and slipped into the hole in the headstock end of the tube so, after the end plate was removed, the finished washers could be easily driven out of the tube.

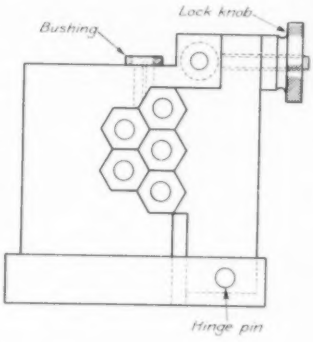
A drilled hole in the end of the plunger allowed clearance for the boring tool, which reduced burrs on the end washers. The complete operation for 50 washers took about 4 min., including time to assemble them, machine, and remove them. *O. W. Anderson, Minneapolis, Minn.*

How to Locate Jigs and Fixtures

IN MANY TOOL CRIBS and fixture stock rooms there is much time lost in finding the correct jig or fixture for a machinist who presents a tool number. The attendant refers to his file, locates the tool by aisle, and then the lost time starts piling up.

Unless the machinist is familiar with the tool and tells him the general size and shape, the attendant must look over a large number of tools in a bin, tip them over looking for the numbered plate, and generally waste time and energy.

This trouble could be neatly reduced, if not eliminated completely, by filing a photograph or an ink drawing of the jig or fixture with the file card—in fact, it could be stapled to the card, or pasted to the back of the card. Most fixtures are unique enough to be easily picked out of a group if the attendant has a good idea of its appearance, and similar fixtures could be separated by placing them in different bins or aisles. *Frank Geblein, Buffalo, N. Y.*



Jig Holds Nuts for Edge Drilling

THE TENDENCY for a drill to run off center, wear unnecessarily and break when drilling through the inclined surfaces of nuts can be stopped with a simple hinged jig as illustrated.

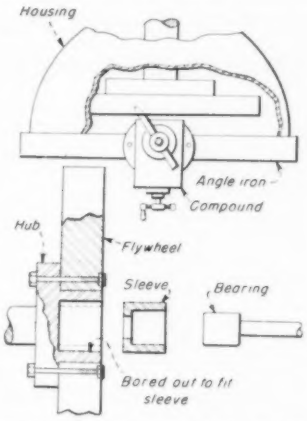
The jig can be built to hold any suitable number of nuts, and is hinged at one end. The other end is clamped by a hinged stud which carries a knurled nut. After one set of nuts has been made, the last nut (nearest the hinged end of the jig) is saved out of the batch and inserted in No. 1 position in the new batch. This makes starting the drill easy and insures that the drill will not break off if the nuts are clamped tight. *T. W. V. Morgan, London, England.*

STAINLESS STEELS, nickel, and similar tough-alloy metals can be drilled, tapped, or die-threaded—particularly in the small wire sizes down to 0-80—more readily if about equal parts of white lead, lard oil, and carbon tetrachloride are mixed to the consistency of light cream and used as a lubricant for the tool.

Crane Bearing Recentered In Crankshaft Sleeve

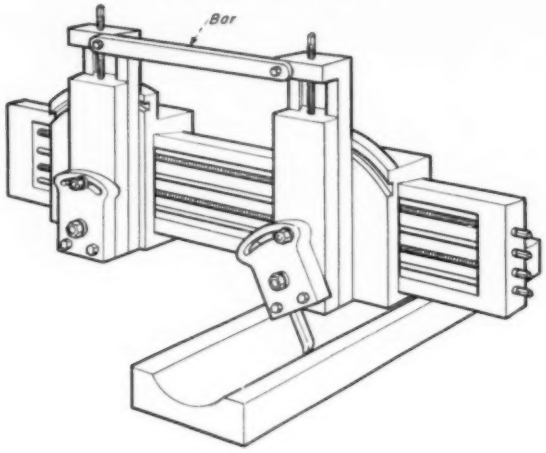
WE HAVE a shipyard crane with a pilot bearing from the clutch shaft working in the bored end of a hub on the crankshaft. This double-row ball bearing eventually wore out the bored diameter until further operation of the engine was impossible. Instead of taking the shaft down to a machine for repairs, which would have taken three weeks and cost us a tremendous amount of trouble and money, we moved part of a lathe up to the engine.

We bolted a length of angle iron across the mouth of the bell housing that inclosed the crankshaft and flywheel and then bolted a



compound rest from a lathe to the angle iron. The rest was squared up with the flywheel with a dial indicator so the tool could be fed in exactly parallel with the axis of the shaft. This was done so we could remove enough stock so a sleeve or collar could be pressed in the hub.

The crankshaft was fairly hard, so a carbide-tipped tool was used to bore out enough stock inside the hub to allow a collar to be fitted. Rotation of the work was provided by running the engine at quarter throttle. The collar's ID fitted the original pilot bearing, and after assembly the bearing worked like the mechanism was new. *Peter Cervelli, Hicksville, N. Y.*



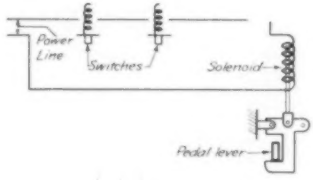
Radius Cut on Planer with One Head Rotating the Other

THE RECENT ARTICLE on a "gooseneck planing cutter" reminded me of a job I set up on a Gray planer. It was a 5-ft. steel casting that had to have a 12-in.-radius channel cut the full length of the casting.

I took a piece of cold-rolled steel that was 36 in. long with a 2 x ½-in. cross section and drilled and reamed a 1-in. hole in each end. Then I pinned one end to the left-hand head of the planer and pinned the other end to the top left-hand corner of the right-hand head, as illustrated. The four nuts on the right-hand head were slacked off enough to allow the head to rotate on the center pin.

The tool was mounted at an angle so the head would cut the right-hand edge of the channel first, and it was set so its tip was exactly 12 in. from the centerline of the center pin. I engaged the feed on the left-hand head, toward the right-hand head, so the steel bar forced the right-hand head to rotate as the cross-feed moved and the planer operated the table.

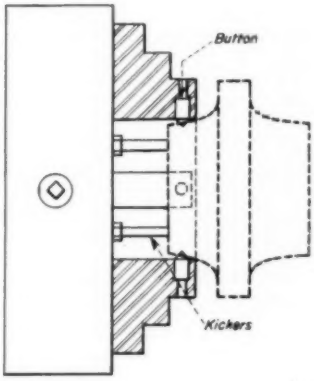
This cut an accurate, smooth radius in the work. I used the graduations on the headscrew to adjust for roughing and finishing cuts. Locknuts on the head bolts assured the proper slack on the turning head so it rotated on the center pin. *Edward Farrell, Mt. Savage, Md.*



Solenoid and Switches Provide Press Safety

OLD PUNCH PRESSES without safety switches to engage the operator's hands during the stroke of the ram can be fitted with two pushbuttons and a solenoid to make the press automatically safe.

One of our presses was equipped with two switches, located on each side of the front of the bed, and these were wired in series with a solenoid mounted above the pedal. A pivot was located on the machine frame to anchor a strong catch which was connected to the solenoid. Normally this catch fitted under the pedal lever and prevented its motion downward, but when the operator pressed both switches, the solenoid moved the catch up and away from the lever and the pedal could be depressed. *L. Remacle, Waasmunster, Belgium.*

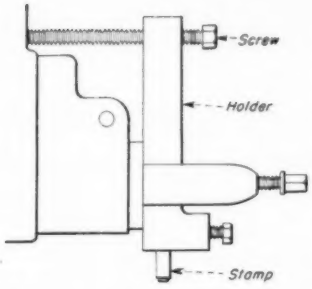


Hardened Buttons Grip Sides of Drafted Parts

DRAFT on some cast hubs we were machining caused the parts to jump out of the chuck often when heavy cuts were taken. We stopped this tendency by inserting a small pointed button in each chuck jaw.

The jaws were annealed, drilled, reamed, and counterbored for the ⅜-in. buttons, which were ⅝-in. long and tapered to 80° points. The buttons were hardened to Rockwell C 57-59, and the chuck jaws were rehardened.

Now the parts are chucked back against locating kickers on the chuck and the buttons dig into the drafted sides, holding the parts for heavy cuts without trouble. *Fred H. Lingenfelder, Milwaukee, Wis.*



Shaper Rolls Trade Marks

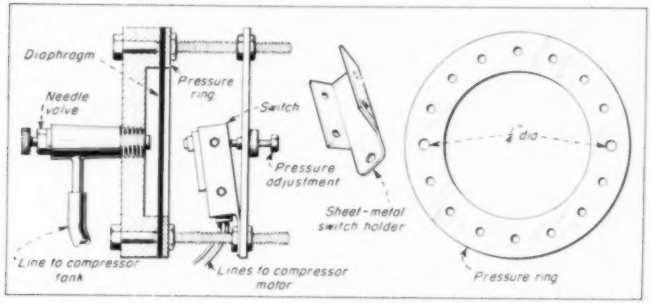
YOU CAN'T stamp trade marks on tubing with a punch press because the force of the blow will deform the tubing. After the kinks were worked out of the method, we found that rolling the marks on tubing did the job without damaging the tubing and worked faster than a press.

The steel stamp was clamped in a special long holder that was set up in a shaper head. A long screw was set through a tapped hole in the upper end of the holder to rest against the shaper slide. This clamped the clapper box.

Length of stroke and depth of cut were adjusted to mark the tubing while it rolled under the tool on a flat piece of steel. New stock was fed onto the plate during the backstroke, and one stroke finished each part. *Bernard Levowich, Brookline, Mass.*

Alcohol Conditions Rubber

WATER, or soapy water, is often applied to knives or punches when die rubber must be cut, but the best conditioner I know of is alcohol—any kind. It makes the rubber cut like paper. *Jack Harris, Long Island City, N. Y.*



Air-Compressor Switch Has Fast Leveling Action

HAIR-LINE control over small air compressors is possible with the illustrated automatic pressure switch.

The housing, diaphragm, and pressure ring were drilled together so the holes would match exactly. Kinghorn metal was used for the diaphragm, and the housing and pressure ring were machined steel. Two ¼-in. holes were drilled to take two long assembly bolts, and 18 3/16-in. holes were drilled around the remainder of the circle.

A strap was held to the assembly bolts by locknuts. This supported an adjustment screw which located the Micro switch. The switch, a normally closed model, was held in a sheet-metal frame pivoted next to the strap on one of the bolts. It allowed the switch to be adjusted to control the expansion of the diaphragm.

With the needle valve nearly closed, the switch action was slow and allowed a fair amount of pressure deviation, and also allowed the compressor motor long resting spells. With the valve open, the action was rapid, and the switch responded rapidly to small changes in pressure. *Dennis D. Unruh, New Orleans, La.*

$25 *In addition to regular payment*

for the best PRACTICAL IDEA

An extra payment of $25 will be made for the best Practical Idea in each number of *American Machinist*. To avoid bias, the selection will be made by readers, a different group each time.

PAYMENT—$25 in addition to regular rates for the item as published, to be paid as soon as reader votes are received—usually three to four weeks after the date of the issue. The winner will also be announced in these pages as soon thereafter as practicable.

JUDGES—A group of 200 *American Machinist* readers is asked to select preferred articles in each issue. The group is a true cross-section of all readers, and changes entirely each time. Their votes, in addition to guiding the editors, select the best Practical Idea. If at any time their votes result in tie, $25 will be paid to each and every co-winner. Decision of the readers will be final in each case.

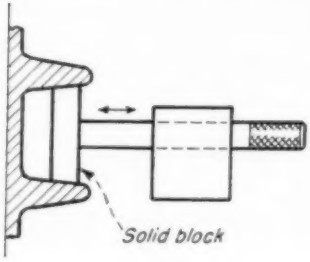
REQUIREMENTS—Only items in the Practical Ideas pages are eligible, and they must be submitted directly by the originator. Do not worry about your shortcomings as a draftsman, photographer or author—every item will be edited in accordance with *American Machinist* standards and suitable illustrative or explanatory material added where needed. Readers will judge only the finished product—in terms of its usefulness to them.

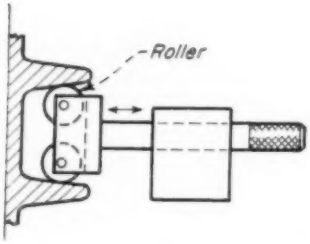
WHO MAY ENTER—Anyone may enter except employees of the McGraw-Hill Publishing Co., Inc., and those of advertising agencies or departments. Suggest to your employees that they submit ideas.

HOW TO ENTER—Send your entry to "Practical Ideas Editor," American Machinist, 330 West 42d St., New York 18, N. Y.

78th Winner:

John Homewood
Radii Cutter

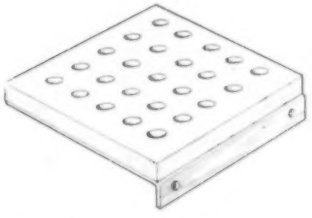




Roller Block Locates Castings

RIBBED CASTINGS or forgings often must be located in fixtures by a positioning block which rests against the ribs to find the position and is then withdrawn. With customary draft angles, solid blocks with angled sides often stick between ribs after the parts are located.

Instead of solid blocks, we employ blocks with rollers mounted so as to ride against the ribs. These do not stick, and if they are mounted properly, are quite as accurate. Rollers are pinned in a slot in a new block. *Robert Mery and Victor A. Ritz, Farmingdale, L. I., N. Y.*



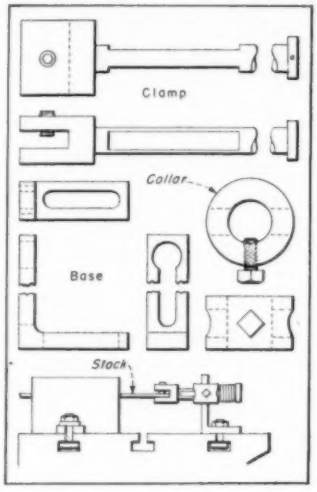
Spotwelding tips are stored in this holder made from a drilled block of wood backed by a piece of sheet metal. The flange can be bolted or welded to any convenient bracket near the welder. **Raymond F. Ball, Utica, N. Y.**

Milling Tool Locates, Steadies And Separates Flat Stock

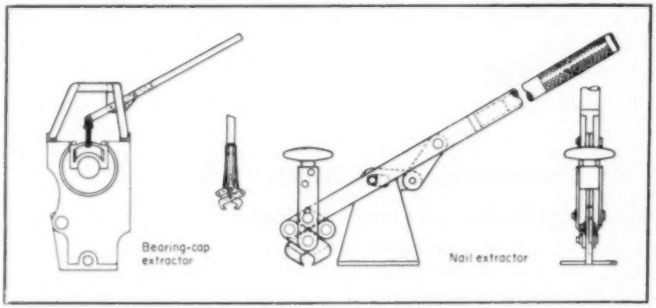
MILLING OPERATIONS where strip stock is cut off are speeded and made more accurate with a triple-purpose tool. It acts as a stop, a work steadier, and as a pull-back that pulls the cut-off piece away from the main part of the stock just as the cut is finished.

The angle-plate base is slotted for adjustment in both faces, and is clamped to the milling table. A collar supports a long, spring-loaded jaw clamp which is assembled through the vertical slot in the base.

After correct adjustments are made, the device works in this way: Stock is put in the vise and pushed into the jaw until it is forced against the collar. The set-screw in the jaw is tightened on the stock, and the stock is then pulled back through the vise to as far as the spring will compress. The vise is clamped tight and the cut made. When the cut is finished, the spring will jump the part away from the vise for easy unloading.



Initial adjustment can be made by locating the stock in the vise for the correct length to be cut off, clamping the jaw on the work with the strip at the full depth of the slot, moving the base back until the spring is fully compressed, and clamping the base to the table. *H. Moore, Leeds, England.*



Two Extractors Lift Bearing Caps and Nails

APPROXIMATELY straight-line lifting is accomplished with both the illustrated extractors, and any slight deviations from a vertical pull are compensated for by the "lazy tong" linkage.

The frames for both devices are made from mild-steel bar and plate. Both handles are tubing, cut to size, drilled, and knurled for a good grip. The bearing-cap lifter is formed at the jaws to fit the caps, but the nail lifter is designed like a hammer claw and can be employed to raise any nails. This lifter has many applications in packing and crating shops. *Robert Brown, Wolverhampton, England.*

NEWS OF METALWORKING

Industrial Production Due for Sharp Drop, Economists Predict

WASHINGTON—Industrial production is due for a sharp drop. This is the consensus of some of the best-informed economists in government.

Last April, government economists were basing price forecasts on this assumption: the Federal Reserve Board Index of Industrial Production would decline from the March level of 184 to about 174.5 by December.

Today, the men in Washington who follow production patterns are much more pessimistic. As they see it, the past two months have worked a great change in the business outlook.

Prospects now are for a much sharper fall in the general index of industrial output—possibly even to 151; that would be a drop of more than 13% from May's 174 and a drop of about 22.5% from the post-war peak (195 in October, 1948).

The decline could even be greater. Indeed, if production continues to fall at the current rate, the index would touch 130 by December.

Of course, not all the forecasters think that the index will go so low. But even the most hopeful don't expect a December level of more than 166. That would be almost 5% below the May figure and 15% below October, 1948.

Biggest Drop in Durables

All agencies expect the biggest fall to occur in durables—but there's wide disagreement as to just how great the fall will be. Non-durables on the other hand are generally expected to hold up pretty well. Minerals may end the year at about current levels — even allowing for further softening in coal.

Generally speaking, the production experts agree that the U.S. is currently passing through a "short cycle," with renewed expansion due in the spring or summer of 1950. One man looks for the low point this fall; most, however, expect it next spring.

The more hopeful think that rock-bottom, which will come next spring, will be about 155 and will be equivalent to about 5-million unemployed. Their December forecast of 166 is equal to about 4.5-million jobless.

The pessimists think that the general index may shade below 150—equivalent to about 5.5-million unemployed. (Some estimates around town go as high as 6-million.)

Durables Down Already

Production of durable goods has already fallen sharply (about 9%) since the postwar peak was reached last October—from 231 on the index to April's 213. Economists expect another 9% drop by the end of this month—to about 195-200.

By next December, the index is expected to fall by still another 5 to 20 percent—to anywhere from 157 to 185. The divergence of opinion is due to uncertainty over the outlook for producers' goods. The optimists think steel output, for example, will only drop to 75-80 percent of capacity by December; the pessimists expect operations to go as low as 67 percent.

The outlook in minerals production is essentially strong; prospects are for continuation of current output levels.

By April minerals production had already dropped 10% from its post-war peak. And now it looks as if, by the end of this month, it will have dropped another 5 or 10% to about 130-137.

Below is a consensus of the thinking on the outlook for industrial production:

INDUSTRIAL PRODUCTION (Seasonally Adjusted Indexes)

	POST-WAR PEAK	APRIL	JUNE	DECEMBER
Industrial Production	195	179	168-171	151-166
Durables	237	213	195-200	157-185
Non-Durables	179	161	155-158	148-158
Minerals	161	146	130-137*	135-140
Iron and Steel	233	219	195-201	155-170
Transportation Equip.	244	238	235-236	200-205
Machinery	283	238	220-225	175-186
Non-Ferrous Metals	201	177	150-155	135-142

*John Lewis' stabilizing period and part of the coal miners' vacation have been allowed for in estimating Minerals Production; 2-3 points have been subtracted.

Out of the Clouds Come These Facts on the B-36

WASHINGTON — Out of all the confusion and squabbling over the super bomber-super carrier issue in Congress emerge these "facts":

1. The B-36 can fly 10,000 miles with 10,000 lb of bombs.
2. It can be intercepted by the most modern fighter planes —whose speeds are almost double that of the bomber.
3. At least one bomber (the B-50) could do the same job—if it were refueled in the air somewhere along its journey. The Navy has a long range plane, too—it holds the long-distance flight record of 11,236 miles—without a bomb load.
4. Other bombers and fighters are on order for the Air Force. The totals so far are 504 other bombers and 3,633 fighters of various types. These won't include the fiscal 1950 allocations.
5. Orders for the B-36 now total 169.
6. The Navy's present carriers could provide fighter cover for the B-36, or any other bomber, over parts of Europe and Asia. They couldn't cover more than 500 miles from the ocean nearest the target.

***DR. KARL T. COMPTON**, until recently president of Massachusetts Institute of Technology, has been elected a director of the McGraw-Hill Publishing Co. Dr. Compton is chairman of the Research and Development Board of the National Military Establishment.*

Problems of Changing Market Theme of Stampers' Meeting

CLEVELAND—Problems and policies in a changing market will be the theme of the annual convention of the Pressed Metal Institute here July 20-22 in the Cleveland Hotel.

Primarily a business and technical meeting, the planning has pointed toward a program which will make the gathering of real business benefit to members of the entire industry, all of whom are invited. Technical and educational meetings are set up for all daytime sessions with the lighter side taking over only the two scheduled evening events. Qualified experts in their respective fields will deliver the two luncheon addresses, while the morning and afternoon sessions not given over to the formal business of the Institute will be devoted to informative discussions of current operating problems.

Guests of the convention will be the members of a visiting stamping productivity team from England.

Tour of Sheet and Strip Mill

Opening session of the convention will be a conducted tour of the Republic Steel Corp's sheet and strip mill in Cleveland.

A formal business session opens the morning program July 21 at which the annual business of the Institute is scheduled for discussion. This meeting will undertake a revision of the constitution of the group, will hear reports from officers and the managing director, and will elect members of the board for the coming year.

Luncheon this day will present A. T. Colwell, vice president, Thompson Products, Inc., who will discuss jet engines and jet propulsion. This will be an illustrated talk and will present much of interest in that parts for jet engines give promise of an increasing market for the stamper.

Four Technical Discussions

The afternoon's technical discussions will be presented by the Toledo district of PMI. Four leaders from the technical side of the industry will speak: Ray Peterson, Peterson Engineering Co., "How the Schools Can Aid in the Training of Die Engineer Personnel"; George Lober, Superior Spinning & Stamping Co., "How the Metal Spinners Work with Stamping Companies"; Homer Percival, Acklin Stamping Co., "Recognized Seniority and Job Preference in a Stamping Shop"; and William Von Behren, Swartzbaugh Mfg. Co., "History of a Government Job" and "Rectangular Deep Draws in Aluminum."

A banquet and entertainment will fill Thursday evening, July 21, planned in cooperation with the associate members of the Institute.

Topic for the Friday, July 22, morning session is "Where We Stand Today—A Review and Preview." Speakers on this program will include Oliver F. Fancey, Washington representative of the Institute; Eugene Schwartz, labor relations consultant to the Institute, and Robert Weaver, Jr., a member of the Small Business Advisory Committee to the Secretary of Commerce.

Luncheon on the 22nd is planned as a major event in the three-day program. Burnham Finney, editor, AMERICAN MACHINIST, will make the key address, taking as his topic "Where We Stand Today." In addition, two or three representatives of the English productivity team will offer brief comments on the American scene as they have observed it.

50-Year-Old Production Line Set Up at Timken Open House

CANTON, Ohio — Timken Roller Bearing Co. inaugurated its 50th anniversary celebration with an open house. June 20-24, held simultaneously in the firm's other plants in Columbus, Zanesville, and Wooster, Ohio; in Colorado Springs, Colo., and St. Thomas, Ontario, Canada.

A feature of the Canton open house was a short production line, set up with workers dressed in clothes of the period operating 50-year-old machines to make Timken bearings as they were made in 1900.

U.S. Machinery for French Steel Mill

WASHINGTON—Nearly all production machinery and equipment will be supplied by U.S. firms in France's ECA-backed effort to shoot toward a crude steel production target for 1951 of 12.7-million metric tons a year. From that figure, plans of the French steel industry are to produce 8.9-million tons of finished steel.

In order to come anywhere near achieving this goal, sheet and plate production will have to be stepped up. For this reason ECA has approved and agreed to help pay for a 66" hot strip mill (including slabbing mill) at Denain d'Anzin, near the Belgian border, and a cold equipment mill at Monataire.

Production from the two plants will raise France's annual totals as follows: Hot rolled plates, 45,000 metric tons; hot rolled sheets, 245,000; three-stand cold mill, 220,000; and temper pass mills, 90,000. Total is 600,000 metric tons.

All told, dollar expenditures will run $29 million, of which ECA is supplying $12 million; the World Bank and the Export Import Bank are supplying the rest of the financing.

U.S. firms who have received contracts to supply equipment are: Heppenstall Co., Bridgeport, Conn.; Westinghouse Electric Corp., and United Engineering & Foundry Co., Pittsburgh; Morgan Engineering Co., and Alliance Machine Co., Alliance, Ohio; International General Electric Co., New York; Wean Engineering Co., Inc., Warren, Ohio; Timken Roller Bearing Co., Canton, Ohio.

***OPEN HOUSE** held recently by L. S. Starrett Co., Athol, Mass., drew more than 1,000 visitors. Cost of the affair, including lost production time, was not inconsiderable, but Starrett management found it well worth while in public relations. Here one of the 30 guides explains lathe functions in tool and machine room.*

Compromises on New Labor Law Point to Retention of Taft Features

WASHINGTON — Compromises on both sides have narrowed considerably the area of disagreement in Congress on what should be included in a new labor law. This much is certain: much of the Taft-Hartley labor law will stick.

Here are some of the provisions almost certain to stay in any new law:

Free speech—for both employers and unions.

Bargaining—unions as well as employers must bargain in "good faith."

Affidavits—non-Communist oaths from union officials and employers who wish to use the Labor Board.

Financial reports—from unions and maybe employers, too, if they want to use the Labor Board.

National emergencies—temporary injunctions and/or plant seizure to cope with them.

Secondary boycotts—some restrictions on them.

Jurisdictional strikes—curbs on them, too.

The big fight is over injunctions, both in national emergency disputes and against unfair labor practices by either unions or employers.

In national emergencies, the Democrats, with labor support, hope to substitute a 90-day "tough" plant seizure by the President for the present injunction authority. Taft, to placate his colleague, Sen. Ives, added plant seizure to the present provision, thus giving the President the right to invoke both the injunction and seizure, or either.

As to unfair labor practices, Taft insists on giving the National Labor Relations Board discretion to enjoin them when necessary. He would drop the Taft-Hartley provision which makes it mandatory to seek an injunction, immediately, against all secondary boycotts and jurisdictional strikes. But the discretionary injunction would be retained.

Some relaxation of the closed shop ban is in the cards, such as to permit the hiring hall on a voluntary basis.

'American Machinist' Now on Microfilm for Libraries

NEW YORK—Issues of AMERICAN MACHINIST and a number of other McGraw-Hill publications are now available to libraries in microfilm form, through an agreement made by The McGraw-Hill Publishing Co. with University Microfilms, 313 N. First St., Ann Arbor, Mich.

Under the plan, the library circulates the unbound printed issues from two to three years, until they begin to wear out or are not called for frequently. Then the paper copies are disposed of and microfilm is substituted.

Sales are restricted to those subscribing to the paper edition, and the film copy is distributed only at the end of the volume year.

Inquiries concerning purchase should be directed to University Microfilms.

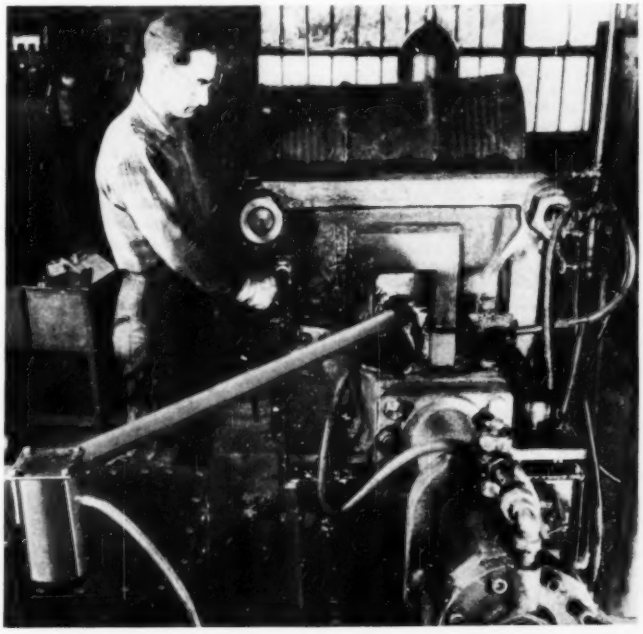
Need for Handling Interest Cited

TOLEDO—Speakers at the Great Lakes Materials Handling Conference, held June 13-15 at the University of Toledo, stressed the point that top management of industrial plants must still be sold on the value of efficient materials handling systems. The conference drew 115 engineers and technicians from Ohio, Michigan, Indiana, Illinois, Pennsylvania and New York.

Milton A. Cox, chief traffic manager of the Doehler-Jarvis Corp. and president of the Toledo chapter of the Materials Handling Institute, opened the conference, and Dean C. K. Searles of the University's College of Business Administration introduced the speakers.

All levels of management must be made interested in good materials handling, according to Robert Brade, supervisor of industrial engineering for the Ingersoll Steel division of Borg-Warner Corp., Chicago. J. H. Conklin, sales manager of Clark Equipment Co., Battle Creek, Mich., amended that point by declaring that a good system for expediting the flow of materials and production through a plant can be an important cost saver for almost every department.

A feature of the conference was a visit by members to the Owens-Illinois Glass Co.'s Duraglass center, where tests for developing packaging standards were explained.



AUTOMATIC LADLING, developed by Lindberg Engineering Co., Chicago, for removing molten aluminum from furnace to die casting machine. Furnace's discharge side is sealed with metal plate through which extends refractory tube. By means of hollow graphite block and graphite tube on furnace cover, discharge chamber is connected to injection sleeve ahead of piston. Pressure line, with control and solenoid valve, extends through cover to connect nitrogen tank. Timer synchronized with controls on die casting machine opens valve to admit 1 lb of pressure to molten metal surface.

Passenger Car Powered by Gas Turbine is Still Long Way Off

FRENCH LICK, Ind.—The gas turbine, unchallenged for propelling high speed aircraft, appears unlikely to become overnight a satisfactory, cheap power plant for the nation's passenger autos, William A. Turunen of General Motors Research Laboratories told the summer meeting of the Society of Automotive Engineers here on June 8.

From what is known about the gas turbine today, he declared, this new type of motive power would face these obstacles when compared with the conventional reciprocating engine:

Fuel consumption for turbines is high, especially at part throttle. Controls and limiting devices must be developed for safe operation. Space requirements appear large—the airflow system of a 125-hp turbine, which was chosen for Mr. Turunen's study, must accommodate greater air volumes than a conventional engine of the same power rating. Lower first cost appears questionable, since materials to withstand high temperatures generally are costly and difficult to fabricate. Lower maintenance cost is doubtful. Exhaust may be objectionable. A separate device to produce braking torque may be required since the turbine is a free-wheeling device. Silencing may present a difficult problem. A large reduction gear ratio is required. The power required for automotive use is too low to show turbines at their best advantage, best results being obtained with turbines of large power capacity.

Advantages of Gas Turbine

At the same time, the GM Research engineer offered these advantages the gas turbine would have over conventional engines: It may operate with a wide range of fuels. Absence of power impulses, such as power thrusts, probably would reduce the vibration problem. Lubrication may be simplified. Electric ignition is required only for starting.

In examining the known facts about the gas turbine in detail, the speaker described a hypothetical turbine-powered automobile. It was compared with a 125-hp conventional engine in a 4,000-lb automobile. (See illustration p. 112.)

He said it probably would be propelled by a dual turbine arrangement, consisting of a compressor, combustion chamber, compressor turbine and power turbine—"the simplest form of the turbine engine which can be called adaptable" to road vehicle use.

A turbine-driven compressor, referred to as the gas generator unit, would operate independently of the power turbine unit, which supplies the power or torque to the motor driveshaft. The gas generator unit utilizes only enough energy from the hot gases to drive the compressor, leaving most of the high energy gases for the power turbine. Thus, the two units, in effect, would be gas coupled.

"Although the gas turbine has often been described as a simple machine with one working part, this simplicity may be deceptive," he pointed out. "A complete installation is a very bulky group demanding the utmost in design effort if machinery space is to be prevented from overrunning the passenger cargo space. This is due primarily to large air requirements demanding space-consuming ducts."

ECA Reports Good First Year; $115 Billion Income

WASHINGTON — ECA's first year was a good year, it was indicated by reports here.

Western Europe's national income in 1948 totaled about $115 billion, against $98 billion the year before. Last year all of this increase, and more—some $30 billion—was plowed back into the economies of the participating countries as investments.

Mine and factory output is up 14% over 1947 and is equal to prewar. Except for Bizone Germany, ingot steel production tops prewar, is 25% above 1947. Even Germany has hit a production rate of 8-million tons a year. Target in 1949-50 is 9-million tons.

Most of $211 Million in Oil Equipment For Europe Will Be Spent in U.S.

WASHINGTON—Marshall Plan Europe plans to spend $592.4 million for petroleum equipment in fiscal '50, according to a commodity breakdown report released this month by ECA. Of this $211.6 million will be spent in the "dollar area" (mostly U.S.)

These figures include purchases by U.S.-owned subsidiaries and by joint U.S.-U.K. ventures overseas which ECA has decided to finance in the same manner as wholly-owned European companies.

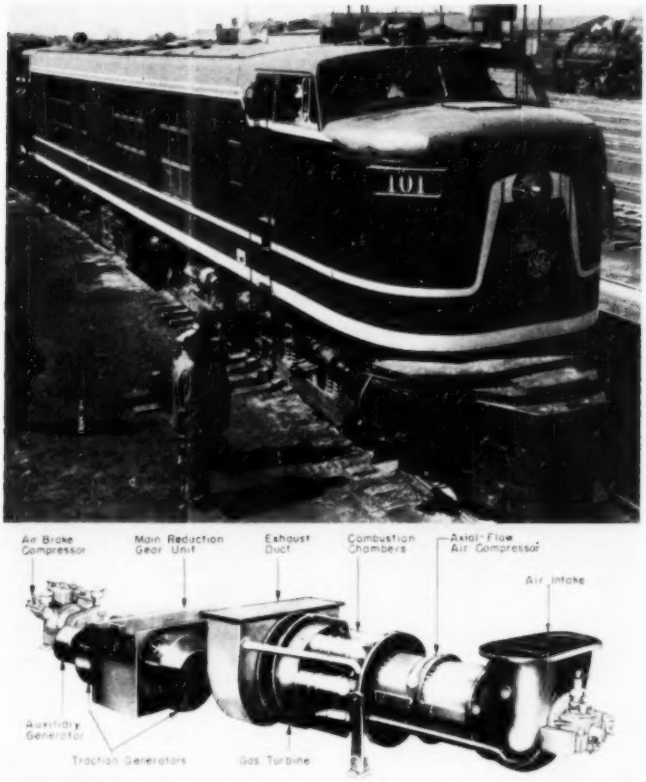
Of the total $211 million to be spent in the western hemisphere, $108 million will be for equipment to be used in participating countries, $32 million in their overseas territories, and $71 million for use in their holdings in non-participating countries.

Here's how fiscal 1950 buying plans break down into types of equipment:

Type of Equipment	Dollar Sources (In Thousands of Dollars)	Non-Dollar Sources	Total
Drilling	53,774	51,694	105,438
Well Casing	13,800	17,122	30,922
Refining	124,127	189,129	313,256
Transportation & distribution	no estimates made for fiscal 1950		
Storage	15,260	81,003	96,263
Pipe Lines	2,645	40,850	43,495
Miscellaneous	no estimates made for fiscal 1950		
Undistributed[1]	2,000	1,000	3,000
TOTAL	211,576	380,798	592,540

(1) Represent program for French Overseas Territories for which no breakdown by type of equipment is available

***MACHINERY DEALERS** National Assn. was presented with a Leach Grinder by the manufacturer, to be given away at the MDNA banquet at Virginia Beach, Va. E. N. Maxwell drew the lucky number, promptly put the grinder up for auction to highest bidder, netting the MDNA treasury $1,100. Here, left to right, are J. H. Goodman, H. Leach Machinery Co., Providence; S. Danits, Donberg & Danits, Chicago; S. Noll, Noll Equipment Co., Cleveland; R. Hochman, Ralph Hochman & Co., Newark, N. J.; M. Leach, H. Leach Machinery Co.; and E. J. Johnson, Jr., Strom-Johnson Machinery Co., Chicago.*



***FIRST GAS TURBINE** electric locomotive built and operated in the U.S. is this ALCO-GE 4500-hp unit, to be used in trial freight service by Union Pacific. In operation, air is drawn through a compressor into several combustion chambers. Fuel is injected and the mixture burns, raising the temperature of the compressed air. Resulting gasses expand and move at great velocity against the turbine blades, turning the shaft. The shaft drives both the power plant compressor and the generator. Power from the generator is supplied to eight traction motors, each driving one of the eight axles.*

Amertool Elects Officers

CINCINNATI—Nelson F. Caldwell, vice president Cincinnati Milling & Grinders, Inc., was elected president of Amertool Services, Inc., at the organization meeting here June 16. The company (*AM*-June 16, p. 117) consists of 11 machine tool builders banded together to do business in Latin America. It has been granted a $3 million revolving credit by the Export-Import Bank.

Stanley A. Brandenburg, Monarch Machine Tool Co., is first vice president of Amertool; James C. Hebert, Jones & Lamson Machine Co., second vice president; Daniel R. Weedon, Blanchard Machine Co., secretary; Robert Lippard, Heald Machine Co., treasurer; and E. W. Mueller, Cincinnati Lathe & Tool Co., assistant secretary and treasurer.

In addition to the above officers, the directors include T. A. Gerard, Cone Automatic Machine Co.; R. E. King, Fosdick Machine Tool Co.; Edward D. Frank, National Automatic Tool Co.; W. G. Baldenhofer, Thompson Grinder Co.; and John M. Dolan, Hydraulic Press Mfg. Co.

NMTBA Holds Regional Meetings

CLEVELAND — Regional meetings of the National Machine Tool Builders' Assn. are being held in seven cities June 21-30 to talk over problems of the industry, conducted by Lloyd D. McDonald, president, and Tell Berna, general manager of NMTBA. The dates and cities: Worcester, Mass., June 21; New York City, June 22; Rochester, N. Y., June 23; Cincinnati, June 27; Chicago, June 28; Detroit, June 29; and Cleveland, June 30.

AGMA Develops Gear Standards

HOT SPRINGS, Va.—Standardization was the keynote of the 33rd annual meeting of the American Gear Manufacturers Association at The Homestead here June 6-8. Major emphasis was given to this theme in a symposium June 7, with W. L. Schneider, outgoing president, as moderator, and S. L. Crawshaw of Western Gear Corp., J. H. Hunt of General Motors, L. D. Price of NEMA, and W. P. Schmitter, chief engineer of Falk Corp. taking part.

A number of standards in process were reported by committee heads at the final general meeting. Ready for technical editing are Tentative Standards 150.01 on application classification for inclosed gear drives, 461.01 on output speeds, and 265.01 on allowable loads and speeds. T.S. 260.01 on allowable torsion and bending in shafting will soon become a final standard. A standard is being developed for inspection and lubrication of aircraft gas turbine gears. The inclosed worm-gear inspection standard will soon be ready for proposal as an American standard. An open worm-gearing standard is in first draft, except for rating practices; it will compare with the inclosed worm standard when completed.

Limiting values for tooth form are being developed, as is a tentative standard on single-thread hobs for helical gears. Several new hob-form data sheets will soon be published, dealing with nomenclature. The design portion of the fine-pitch standard was cleared for submission to the ASA as an American standard. Rolled fine-pitch worms for instruments will be the subject of a new tentative standard. Aircraft splines (section 84B) will be deleted from the spline standard. Letter symbols will be added to nomenclatures and geometry standard 111.02 as an appendix. The recommended practice for tooth proportions and pressure angles for straight bevel gears is to be revised to include only 20-degree pressure angle, instead of the 14½-, 17- and 20-degree angles now shown.

New officers of the Association were reported previously (*A.M.*, June 16) and an abstract of the talk of the dinner speaker, Gene Flack, appears in "Talking Shop" in this issue.

Bolt, Nut Institute Changes Name

CLEVELAND—The American Institute of Bolt, Nut and Rivet Manufacturers will change its name to Industrial Fasteners Institute, effective July 1. Headquarters will continue in Cleveland, with Herman Lind as general manager.

Detroit

AUTO INDUSTRY IN OPTIMISTIC MOOD . . . PLANTS ENLARGING OUTPUT
CHRYSLER REDESIGNING FOR 1950 . . . GM CARS WITH 12:1 RATIO

Detroit attitudes are always a good deal like an elevator, optimistically rising or pessimistically falling. Right now the viewpoint is on the ascendancy. The auto industry is feeling much better about its prospects.

The reason, of course, is the sustained volume of business which has taken over the spotty picture which prevailed during the late winter months. Activity is good at nearly all sales points—although, with fair uniformity, cars have to be sold, rather than simply delivered. Nevertheless, the prevailing attitude now is that any sloping off, productionwise anyway, will come during the last quarter rather than in midsummer not long after July.

Some Sobering Factors

The improved attitude can be regarded as a move from the basement to the middle of the shaft; it has hardly risen to the penthouse. Though the earlier widespread fears of a notable slump are not to be heard today, there are numerous sobering factors in the overall automotive picture:

1. The truck market is unsteady. Heavy and medium truck sales have leveled off at comparatively low ranges; and one reason lighter truck factory sales are staying high is that some producers are sending out fixed ratios of the commercial jobs along with passenger cars—dealers are taking a mixed package and having to like it.

2. The export market continues to dwindle due to short dollars abroad.

3. Used car prices staged no seasonal upturn at all during the late spring months—a pointed indicator that the demand for cars in general is returning toward normal.

Plan Second Shift Operations

Nevertheless, current ordering for cars has resulted in hurried plans being made for second shift assembly operations at numerous points. None has been put into effect yet, but the reports talk of Chrysler plants (impeded by supplier strikes almost from the day its new models were unveiled), and some of the Ford plants, idle due to the recent strike. Kaiser-Frazer, too, is enlarging output.

Chevrolet is following recent output enlargement at St. Louis with a second shift at its Baltimore assembly plant, increasing employment by 700 and projecting output capacity to 22,000 units a month.

Chrysler is widening its west coast operations. At San Leandro, a Dodge plant, Plymouth cars will henceforth be assembled. At Los Angeles, where Chrysler, DeSoto and Plymouth assemblies were produced, Dodge passenger cars have been added.

These and other output enlargements will bring the first half of the year to a stratospheric kind of output volume, despite the strike barriers of the first six months. Preliminary figures point to output of nearly 3,100,000 cars and trucks in all plants. Only 1929 and 1941 had better comparable figures.

Weekly production during June ran up above 130,000 units per period, the level prevailing before the Ford strike sliced deeply into the totals. And it may go up higher—steel is getting easier almost by the day, and enlarged shipments to the car plants can be confidently expected very soon now. In fact, the likelihood is that by two months from now more steel will be available than the auto companies have capacity or inclination to pick up.

1950 Tooling Prospects Fair

Behind this panorama of the present, a fair—but only fair—amount of tooling work is in process for 1950. In the wake of the Cadillac-Olds body program, pretty well all placed now, Fisher and Ternstedt are releasing garnish molding and other tooling. Nash retooling for its rear end—and perhaps for a new light car—is being placed.

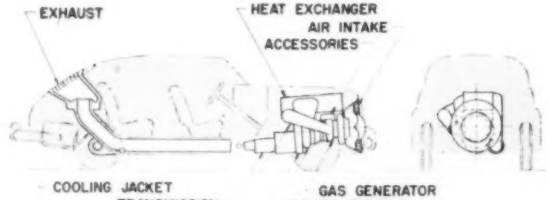
More important than any of these, or others at hand thus far, is the reported rush of redesigning work at the Chrysler Corp. A substantial redo of its recently announced models seems in prospect for 1950 showing.

Not much came out of the Society of Automotive Engineers meeting at French Lick early this month to presage any major developments ahead. Highly interesting engine ideas were opened up for discussion, but they were all for a considerable term ahead, nothing in near prospect.

One interesting phase of the meeting was the well-based report that many General Motors engineers were driving around standard-appearing cars under whose hoods were powerplants of 10:1 and even 12:1 ratios. Mileage per gallon with 12:1 ratio is understood to be up better than 30%, compared with comparable engines of current ratio.

Little Thought Given to $1,000 Car

Little talk was heard at French Lick about small, low priced cars. One reason the engineering fraternity does not devote much attention to the idealized $1,000 car today was amply brought out in a mid-June speech at Detroit by J. R. Davis, sales vice-president of Ford Motor Co. Davis brought out the hardly realized fact that on a $2,000 automobile the tax bill is no less than $511.50. Of this, $90 is the average income tax on the manufacturer, $77 is a vehicle tax, $43 is use tax, $157 is dealer income tax, $80 is dealer personal and property tax, and so on. And these taxes do not take into account any pyramiding from the factory to the sales level. With taxes, then, representing a fourth of a car purchase price, the problem of bringing delivery quotations down is even harder than has been realized.



***A GAS TURBINE** power plant in your car would look something like this, but chances are it will never come to be, according to W. A. Turunen of GM's Research Laboratories, (See Story Page 110). Size of the units indicated in this schematic are to scale on basis of comparable machines of present design efficiency with operating temperature limited to 1350 F. As shown, a complete installation is bulky, due to large air requirements demanding space-consuming ducts. (Illustration courtesy SAE)*

Names in the News

Clarence W. Daniels

Allan F. Hardy, Jr.

Clarence W. Daniels, plants engineer and a director of Norton Co., Worcester, Mass., has retired after 36 years of service. He is succeeded by **Allan F. Hardy, Jr.** Mr. Daniels will continue to participate in the management of the company as a member of the board. Mr. Hardy has been assistant plants engineer.

Col. T. C. Gerber has been named director of the Pipe Joint Division of the Gates Engineering Co., New Castle, Del.

Samuel Wit, sales engineer with Lukenweld, Div., Lukens Steel Co., Coatesville, Pa., has been named district manager of sales of Lukens Chicago office, succeeding **J. H. Faunce, Jr.,** who will assume other duties.

H. E. Heywood, Jr., has been appointed assistant chief engineer of the Toledo plant of The National Supply Co., Pittsburgh.

John S. Michie, formerly of Diebold Inc., Canton, Ohio, has been named works manager of Reeves Pulley Co., Columbus, Ind. He succeeds **H. E. Brooks,** retired.

R. B. Haynes has been named director of manufacturing for all divisions of the Dana Corp., Toledo. **John H. Jones** has been appointed plant manager of the Toledo plant of Dana's Spicer Mfg. division. Mr. Haynes joined the Spicer organization in 1935, becoming works manager about two years ago. Mr. Jones was manufacturing manager in the new Spicer plant at Toledo prior to his new appointment.

W. R. Rupley has been named sales engineer for the A. J. Sparks & Co., Grand Rapids, Mich. Following the war, he served with the War Dept., Army Ordnance section, as an industrial specialist.

George S. Chiaramonte has been appointed assistant sales manager, E. Horton & Son Co., with headquarters in Cleveland. He will have charge of the Cleveland, Ohio and Pittsburgh areas.

Charles M. Wheeler has been elected a vice president of The Union Switch and Signal Co., Swissvale, Pa.

W. N. Fritts, manager of the sales engineering section of General Motors Corp.'s Electro-Motive Div., La Grange, Ill., has been named assistant general sales manager. Other appointments: **Marvin Anderson,** assistant general parts manager; **W. D. Davis** from general repair manager to special assignment to coordinate and expedite new branch shop construction; **M. H. Gardner,** general repair manager at La Grange; **C. R. Wood,** assistant general repair manager, La Grange.

William D. Pomeroy

William D. Pomeroy has been appointed sales representative for Snyder Tool & Engineering Co. in New York, New Jersey, New England and Pennsylvania.

Dr. W. R. Morgan

R. G. Caulley

Dr. W. R. Morgan has been appointed director of production and engineering of the new vitrified division plant of Peninsular Grinding Wheel Co., Detroit. He was formerly director of research at Bay State Abrasive Products. **R. G. Caulley** has been named general sales manager of Peninsular. He was formerly assistant sales manager of Republic Steel Corp. and director of purchases at Fruehauf Trailer Co.

R. P. Connette has been appointed assistant to the president of the American Car & Foundry Co., New York. **Tolbott G. Shipley** has been named district manager of ACF's St. Louis car plant.

E. H. Doering has been named executive vice president of Maumee Malleable Castings Co., Toledo. Other appointments: **N. P. Mahoney,** plant manager; **R. E. Bossert,** sales manager; **H. M. Breese,** secretary.

Harrison Taylor has been named sales engineer of Whiting Corp., Harvey, Ill., serving in the company's New York district office. He succeeds **A. R. Binckes,** recently transferred to Los Angeles.

Mead W. Batchelor, vice president in charge of production, Bridgeport Brass Co., Bridgeport, Conn., has been named executive vice president.

Kenneth D. Mann

Kenneth D. Mann has been elected board chairman of Firth Sterling Steel & Carbide Corp., McKeesport, Pa. Until May 1 of this year he was manufacturing vice president of Reynolds Metals Co. He was executive vice president of Truscon Steel Co. prior to the war. **J. W. Kinnear, Jr.,** has been elected president of the firm, succeeding **L. G. Firth,** retired. Mr. Kinnear has been executive vice president for nearly two years and a director for 15 years. **Howard M. Dawson** has been named sales manager of mid-eastern district New York and Philadelphia offices, succeeding **A. E. Barker,** who was recently named assistant to the president. Mr. Dawson was formerly president, Jessop Steel International Co.

Glenn B. Warren has been appointed manager of turbine divisions, Apparatus Dept., General Electric Co., Schenectady, N.Y. He has named **Edwin E. Parker** to succeed him as manager of engineering of the turbine divisions. Mr. Warren joined GE in 1918, spent several years in charge of turbine design and research, and in 1931 was made designing engineer of the turbine engineering dept. He was instrumental in development of a new type of turbine for propulsion of the main combat ships of the U.S. Navy.

***GLEASON WORKS** Pres. E. Blakeney Gleason presents Henry L. Lampman, gear sales manager, with gold watch, knife, and chain upon his retirement after nearly 40 years with the firm.*

John A. Carter

John A. Carter has been elected president of Oakite Products, Inc., New York. He has been with Oakite for 34 years, serving recently as assistant to the president and, since December 1947, as general manager. **D. C. Ball,** founder and president of Oakite, was elected chairman. **David S. Ball** was elected to the newly created office of first vice president.

Business Items

Sandsteel Spring Co., Inc., is the new name of the former Watch-Motor Mainspring Co., Inc., New York.

The Youngstown Alloy Casting Corp. will build a new $100,000 plant at Youngstown, Ohio, which will include a new foundry and office building. A new coke oven and new automatic controls for the electric furnaces will be installed in the building.

General Motors Corp. this month began construction of its Technical Center on the 350-acre site at Mound and Twelve-Mile Roads north of Detroit. The new center will embrace the research, engineering staff, processing and styling operations of General Motors.

L. O. Koven & Brother, Inc., Jersey City, N.J., has added a metal spraying shop to its facilities at the Jersey City plant.

General Electric Co., Pittsfield, Mass., has sold its cold molded plastics business to the Garfield Mfg. Co., Garfield, N.J., as a final phase of the GE Chemical Dept.'s closing of its Meriden, Conn., plastics plant.

Automatic Steel Products, Inc., Canton, Ohio, has acquired control of The Cleveland Tapping Machine Co., Hartville, Ohio. W. R. Harrison remains as president and general manager of Cleveland Tapping. A. M. Wickwire, president of Automatic, becomes vice president of Cleveland.

Tin Research Institute, Inc., 492 West Sixth Ave., Columbus, Ohio, has been formed to provide free technical service to consumers of tin in the U.S.

Meehanite Metal Corp., New Rochelle, N.Y., has completed arrangements with Sonith Industries, Inc., Indianapolis, for the manufacture and sale of Meehanite castings.

Air Reduction Sales Co., New York, has opened a new acetylene plant in Acton, Mass., with a rated capacity of 100,000 cu ft of acetylene per day.

Obituaries

William R. Timken, 84, cofounder of the Timken Roller Bearing Co., Canton, Ohio, died June 12 in his home at Croton-on-Hudson, New York. Mr. Timken retired from his post as treasurer and vice president of the firm in 1916 when he moved to New York. He retained a directorship in the Timken Co., however, until 1930.

Frank E. DeLong, 53, vice president in charge of sales for Columbia Steel Co., died May 28 in Oakland, Calif. He joined Columbia in 1937, soon becoming Los Angeles district manager of sales, then vice president in charge of sales for the district in 1939, and vice president in 1943.

Fred S. Durham, Sr., president of Bonney Forge & Tool Works, Allentown, Pa., died May 28.

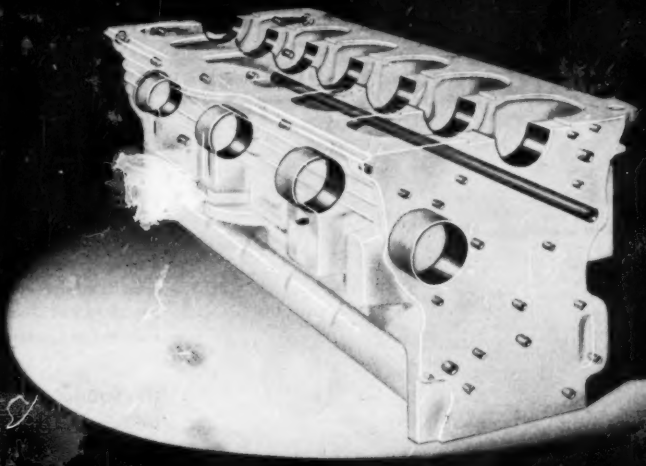
Edward W. Bottcn, 51, secretary-treasurer of the Owens Bucket Co., Cleveland, died June 4. He had been with the firm since 1919. In World War II he served on the War Production Board. He was a member of the Cleveland Chamber of Commerce and the National Manufacturers Association.

Elmer Z. Taylor, founder of the Mono Service Co., Newark, N. J., acquired by Continental Can Co. in 1944, died at his home in East Orange, N.J., May 20. Up to the time of his death he had served Continental as a consulting engineer.

Marinus Brink, 71, founder and president of Cleveland Cold Rolling Mills Co., died June 14. Before organizing his own company in 1926, he had been associated with American Steel & Wire Co. and Elyria Iron & Steel Co. as an engineer.

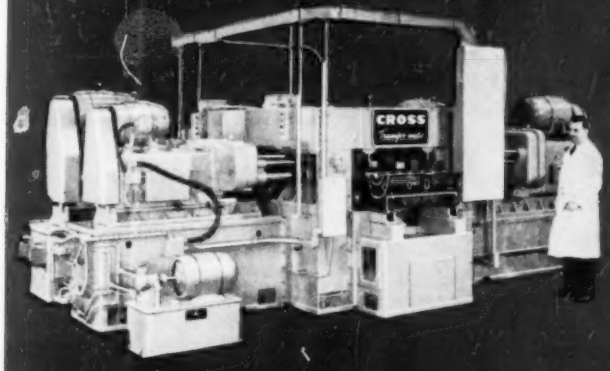
Earl C. Souder, for 20 years an industrial sales engineer in the steel mill section at the Westinghouse East Pittsburgh plant, died June 8. He was a member of the Association of Iron and Steel Engineers.

Another Transfer-matic by Cross



BORES, DRILLS, REAMS

Cylinder Blocks



★ Rough bores seven crankshaft and four camshaft bearings, drills oil gallery hole complete, drills 21 holes in front face, drills 10 holes in rear face, and rough reams two locating holes in rear face. Production requirement, 35 hourly at 100%.

★ Transfer mechanism carries parts from station to station, power elevator positions parts, and individual clamps secure parts at each station.

★ Seven stations include loading station, five working stations and intermediate inspection station.

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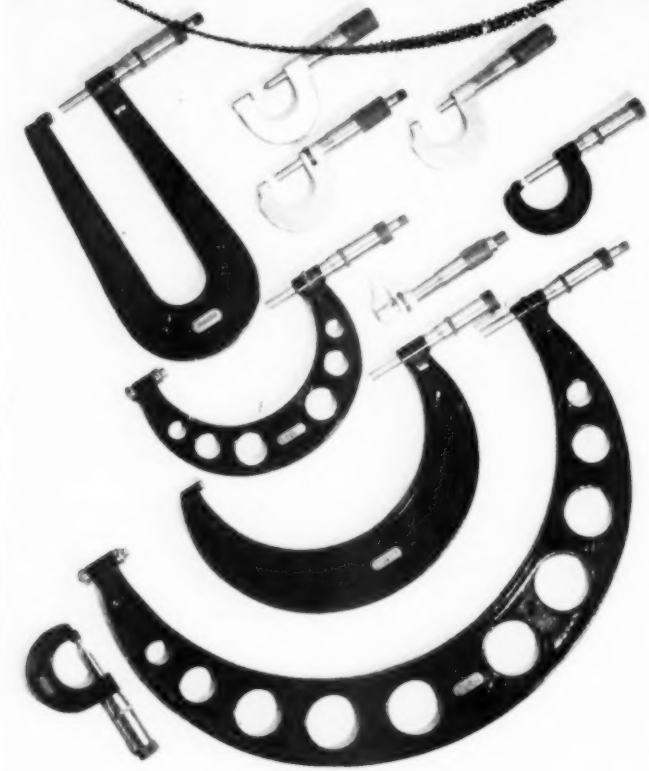

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on thimble and sleeve of *all* micrometers — on the frame of all full finish micrometers. Eliminates glare — markings stand out sharp and clear. Retards corrosion, resists stains. Increases speed and accuracy.

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Turret-Lathe Machining Times...I

COURTESY METHODS DEPT., CLEVELAND AUTOMATIC MACHINE COMPANY

Machining-time allowances for turret-lathe operations, expressed in units equivalent to minutes for practical purposes, are calculated from these charts:

1. Sfpm Chart (below).
2. Feed per Revolution (page 119).
3. Carbide vs. High-Speed Steel Selection Chart (page 121).

Allowances for cutting times have been set slightly higher for carbide tools, to encourage operators to give them proper attention and handling.

Note: Values for sfpm and feed per revolution for carbide *below the diagonal lines* in the first two charts are for combined cuts.

The nomograph, page 121, has seven scales. To determine machining-time allowances for a specific cut, proceed as follows: First consider the material, depth of cut and operation. The recommended sfpm is obtained from the sfpm chart and entered on scale *A*. Diameter of the work is entered on scale *B*. These two points are connected by a line, which is extended to scale *C* to find the rpm.

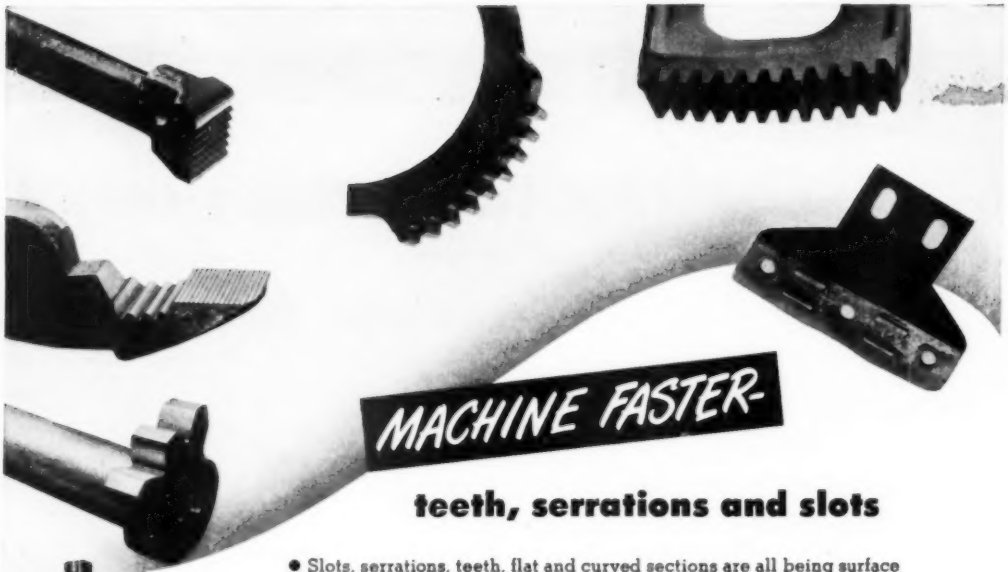
Next, select the feed per revolution

Sfpm Chart

HIGH SPEED STEEL													
MATERIAL 'S.A.E.	DRILL OVER 1/2	DRILL UNDER 1/2	ALL REAMING	DEPTH OF CUT 1	3/4	5/8	1/2	3/8	1/4	3/16	1/8	FINISH CUT
4150HT	39	39	50	32	32	32	36	36	39	39		62
52100			50	34	34	34	37	37	41	41		
CAST IRON			50	50	50	50	55	55	61	61		116
4150	41	70	50	67	67	67	74	74	82	82		155
STEEL CASTING			50	86	86	86	91	91	95	95		105
4615			50	91	91	91	95	95	100	100		180
STEEL TUBING			50	105	105	105	105	105	110	110		171
X1315	61	91	50	110	110	110	110	110	116	116		198
BRONZE			50							155		198

CEMENTED CARBIDE													
	FACING						TURNING AND BORING						
MATERIAL S.A.E.	DEPTH OF CUT 5/8	1/2	3/8	1/4	1/8	FINISH CUT	DEPTH OF CUT 5/8	1/2	3/8	1/4	1/8	FINISH CUT
4150HT	189 / 150	210 / 210	234 / 234	280 / 280	280 / 280	315 / 315	182 / 128	188 / 150	201 / 201	238 / 238	245 / 245	315 / 315
52100	189 / 150	210 / 210	234 / 234	280 / 280	280 / 280	315 / 315	182 / 128	188 / 150	201 / 201	238 / 238	245 / 245	315 / 315
CAST IRON	225	225	250	275	300	325	200	225	250	275	300	300
4150	189 / 175	210 / 210	234 / 234	280 / 280	280 / 280	315 / 315	182 / 150	188 / 175	201 / 201	238 / 238	245 / 245	315 / 315
STEEL CASTING	189 / 175	210 / 210	234 / 234	280 / 280	280 / 280	315 / 315	182 / 150	188 / 175	201 / 201	238 / 238	245 / 245	315 / 315
4615	270 / 270	300 / 300	335 / 335	400 / 400	400 / 400	450 / 450	250 / 183	251 / 208	279 / 279	341 / 333	341 / 341	450 / 450
STEEL TUBING	270 / 270	300 / 300	335 / 335	400 / 400	400 / 400	450 / 450	250 / 183	251 / 208	279 / 279	341 / 333	341 / 341	450 / 450
X1315	270 / 270	300 / 300	335 / 335	400 / 400	400 / 400	450 / 450	250 / 183	251 / 208	279 / 279	341 / 333	341 / 341	450 / 450
BRONZE	200 / 200	225 / 225	250 / 250	275 / 275	300 / 300	325 / 325	200 / 200	225 / 225	250 / 250	275 / 275	300 / 300	300 / 300
STEEL FORGING	189 / 175	210 / 210	234 / 234	280 / 280	280 / 280	315 / 315	188 / 150	188 / 175	201 / 201	238 / 238	245 / 245	315 / 315
3250	189 / 175	210 / 210	234 / 234	280 / 280	280 / 280	315 / 315	188 / 150	188 / 175	201 / 201	238 / 238	245 / 245	315 / 315
1045	219 / 219	244 / 244	273 / 273	320 / 320	320 / 320	375 / 375	202 / 170	202 / 202	227 / 227	275 / 288	288 / 288	375 / 375
1020	270 / 270	300 / 300	335 / 335	400 / 400	400 / 400	450 / 450	250 / 183	251 / 208	279 / 279	341 / 333	341 / 341	450 / 450
WORKING RANGE													

NOTE — When Combining Drilling and Turning Use Lower Right Figures



MACHINE FASTER-

teeth, serrations and slots

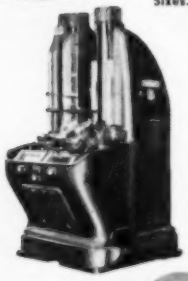
• Slots, serrations, teeth, flat and curved sections are all being surface broached on many jobs faster, more accurately and at less cost than they had formerly been machined. Surface broaching is applicable to steel, cast iron, bronze, copper or aluminum parts. Machines may be tooled up for one specific operation but in many cases more than one part can be surface broached on one machine by using additional sets of tooling. May we work with you in finding where Footburt Surface Broaching Machines can save you money in your plant?

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

Detroit Office: General Motors Building

•

Single Slide Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.



Duplex Surface Broaching Machine. Made in 5, 10, 15 and 25 Ton Sizes.

Continuous Type Machine. Made in 4 Sizes.

INVESTIGATE *Surface Broaching* FOR DIFFICULT MACHINING WORK

FOOTBURT SURFACE BROACHING

A TIME TESTED LINE OF MACHINE TOOLS

Turret-Lathe Machining Times...II

from the appropriate chart, taking into consideration the material, operation and depth of cut. The figure is entered on the *H*-scale of the nomograph. Then length of cut is entered on scale *G*. These two points are connected by a line, which is extended to scale *F*—the revolutions to finish the cut. Now the points on scales *C* and *F* are connected, and the intersection with the *D-E* scales furnishes the unit time for carbide or high-speed-steel tools.

The decision whether to apply carbide or high-speed steel will be influenced by other considerations too. At Cleveland Automatic Machine Company, high-speed steel is used for a boring cut only when boring is done in conjunction with a turning cut on a large diameter. In other words, when the bore is small in relation to the O.D., the sfpm at the bore falls within the cutting-speed range of high-speed steel. So, in that company's practice, about 80% of boring is done with carbide.

Feed per Revolution Chart

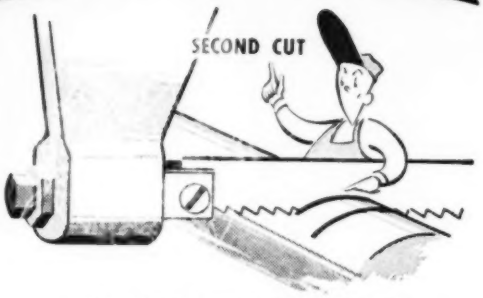
HIGH SPEED STEEL													
MATERIAL S.A.E.	DRILL OVER 1 1/2	DRILL UNDER 1 1/2	ALL REAMING	DEPTH OF CUT 1	3/4	5/8	1/2	3/8	1/4	3/16	1/8	FINISH CUT
4150HT	.005	.005	.0148	.005	.0067	.0081	.0081	.010	.010	.0105		.0018
52100			.0148	.005	.007	.009	.009	.0105	.0105	.0134		.0128
CAST IRON			.0148	.0095	.0128	.0128	.0171	.0171	.0171	.0241		.0134
4150	.0122	.009	.0148	.005	.0067	.009	.009	.0122	.0122	.0163		.0141
STEEL CASTING			.0148	.006	.010	.010	.0122	.0134	.0134	.018		.0122
4615			.0148	.0091	.0122	.0122	.0163	.0163	.0163	.0229		.0163
STEEL TUBING			.0148	.0081	.0116	.0116	.0110	.0122	.0122	.0163		.0134
X1315	.0163	.0122	.0148	.0091	.0122	.0122	.0163	.0163	.0163	.0229		.0163
BRONZE			.0148	.0078	.011	.011	.011	.0116	.0116	.0141		.0128

CEMENTED CARBIDE													
	FACING						TURNING AND BORING						
MATERIAL S.A.E.	DEPTH OF CUT 5/8	1/2	3/8	1/4	1/8	FINISH CUT	DEPTH OF CUT 5/8	1/2	3/8	1/4	3/16	1/8	FINISH CUT
4150HT	.011 / .010	.013 / .009	.015 / .011	.019 / .013	.022 / .022	.011 / .011	.010 / .010	.012 / .010	.015 / .010	.020 / .013		.022 / .022	.011 / .011
52100	.011 / .010	.013 / .009	.015 / .011	.019 / .013	.022 / .022	.011 / .011	.010 / .010	.012 / .010	.015 / .010	.020 / .013		.022 / .022	.011 / .011
CAST IRON	.022 / .022	.022 / .022	.022 / .022	.022 / .022	.022 / .022	.012 / .012	.022 / .022	.022 / .022	.022 / .022	.022 / .022		.022 / .022	.011 / .011
4150	.013 / .010	.019 / .010	.017 / .012	.021 / .015	.022 / .022	.011 / .011	.011 / .009	.013 / .010	.017 / .012	.021 / .014		.022 / .022	.011 / .011
STEEL CASTING	.013 / .010	.019 / .010	.017 / .012	.021 / .015	.022 / .022	.011 / .011	.011 / .009	.013 / .010	.017 / .012	.021 / .014		.022 / .022	.011 / .011
4615	.014 / .010	.015 / .011	.018 / .013	.022 / .016	.022 / .022	.011 / .011	.012 / .011	.015 / .012	.018 / .012	.022 / .015		.022 / .022	.011 / .011
STEEL TUBING	.014 / .010	.015 / .011	.018 / .013	.022 / .016	.022 / .022	.011 / .011	.012 / .011	.015 / .012	.018 / .012	.022 / .015		.022 / .022	.011 / .011
X1315	.014 / .010	.015 / .011	.018 / .013	.022 / .016	.022 / .022	.011 / .011	.012 / .011	.015 / .012	.018 / .012	.022 / .015		.022 / .022	.011 / .011
BRONZE	.023 / .015	.025 / .017	.025 / .020	.025 / .025	.025 / .025	.012 / .012	.023 / .015	.025 / .017	.025 / .020	.025 / .025		.025 / .025	.012 / .012
STEEL FORGING	.013 / .010	.019 / .010	.017 / .012	.021 / .015	.022 / .022	.011 / .011	.011 / .009	.013 / .010	.017 / .012	.021 / .014		.022 / .022	.011 / .011
3250	.013 / .010	.019 / .010	.017 / .012	.021 / .015	.022 / .022	.011 / .011	.011 / .009	.013 / .010	.017 / .012	.021 / .014		.022 / .022	.011 / .011
1045	.013 / .010	.019 / .010	.017 / .012	.022 / .016	.022 / .022	.011 / .011	.011 / .009	.019 / .010	.017 / .012	.020 / .014		.022 / .022	.011 / .011
1020	.019 / .010	.015 / .011	.018 / .013	.022 / .016	.022 / .022	.011 / .011	.012 / .011	.015 / .012	.018 / .012	.022 / .015		.022 / .022	.011 / .011
WORKING RANGE													

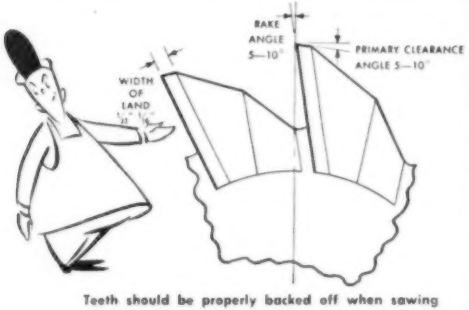
Notes: Use the feed value below the diagonal line when drilling and turning cuts are combined.
When boring with high-speed steel cut the feed values in half.
When boring with cemented carbides, use 0.011 in. feed.
When overhead turning with cemented carbide, use 0.011 in. feed and 3/8 in. maximum depth of cut.

Blade-saving hints for sawing ...by Stainless Sam

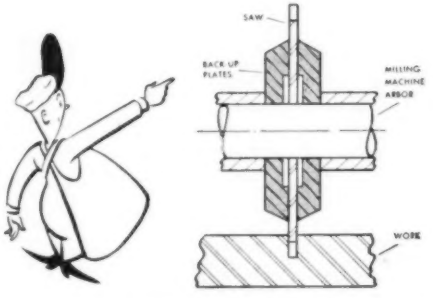
1 When sawing large sections of Stainless Steel, the use of a heavy-duty power hacksaw is recommended. Stainless Sam says that reduced speeds and increased feeds is a good general rule to follow when sawing Stainless Steels.



2 When a blade fails, *start a new cut* with a new blade because the metal has been work-hardened by the old blade. The new blade should not be guided into the same groove. If large quantities must be sawed, longer blade life can be obtained by changing from a water-soluble to a sulfur-base oil.



3 Teeth should be properly backed off when sawing Stainless Steels with high speed steel circular saws. The larger the cutter the smaller the clearance angle. Coarse tooth saws with staggered teeth are recommended for deep, wide cuts. Fine tooth saws should be used for light sections.



4 Whenever possible, flanges should be mounted on each side of the saw to stiffen the blade. Stainless Sam recommends a set-up similar to this outline sketch. Diameters of the flanges should be as large as the depth of cut will permit.

Sawing Stainless Steels is only one of many subjects discussed in Armco's valuable new booklet on machining.

Write for your copy today. It may surprise you to know how easy it is to machine ARMCO Stainless Steels with standard equipment.

And you may be in line for another pleasant surprise if you make a cost-study of each part of your product—comparing Stainless with the material you are using now.

When you write for a copy of the booklet, just ask for "Machining of ARMCO Stainless Steels." Address Armco Steel Corporation, 140 Curtis Street, Middletown, Ohio.

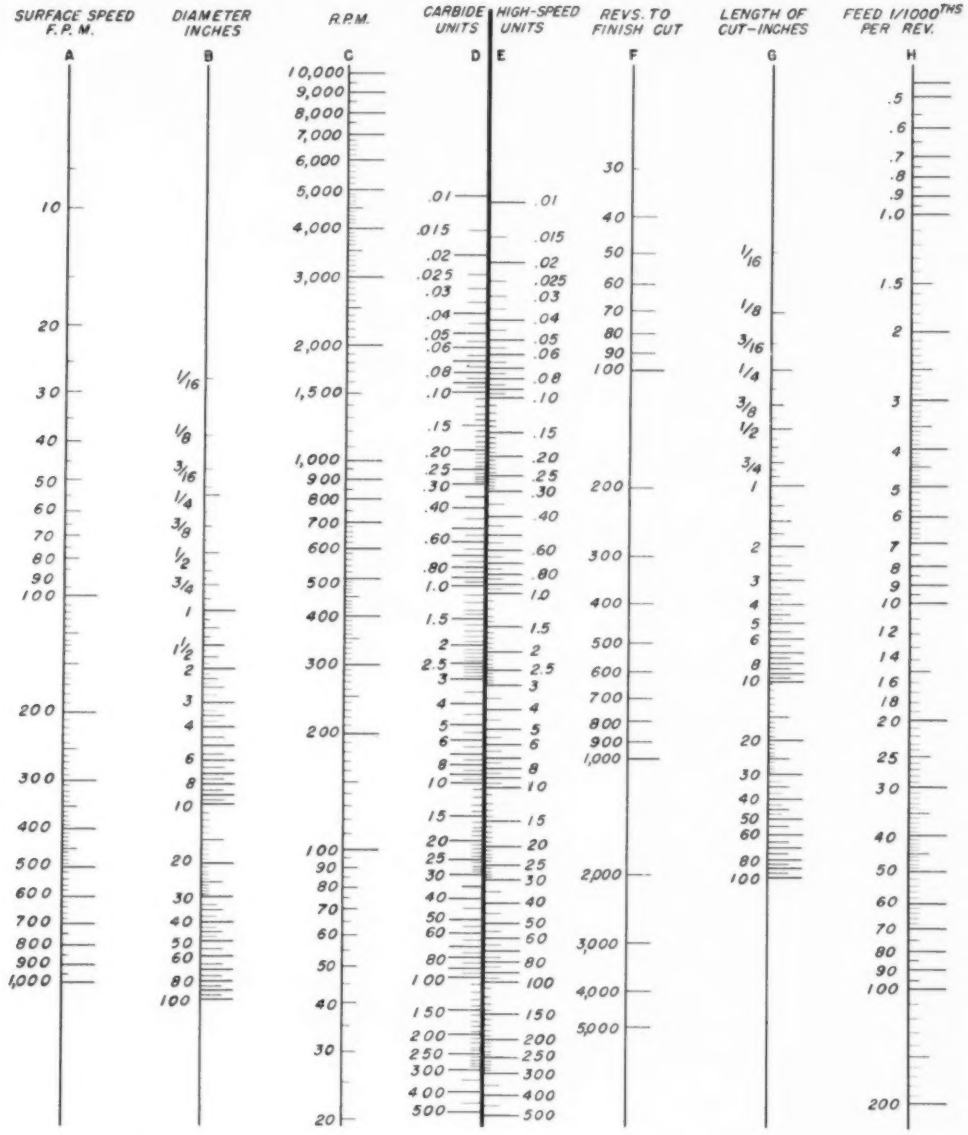
Export: The Armco International Corporation

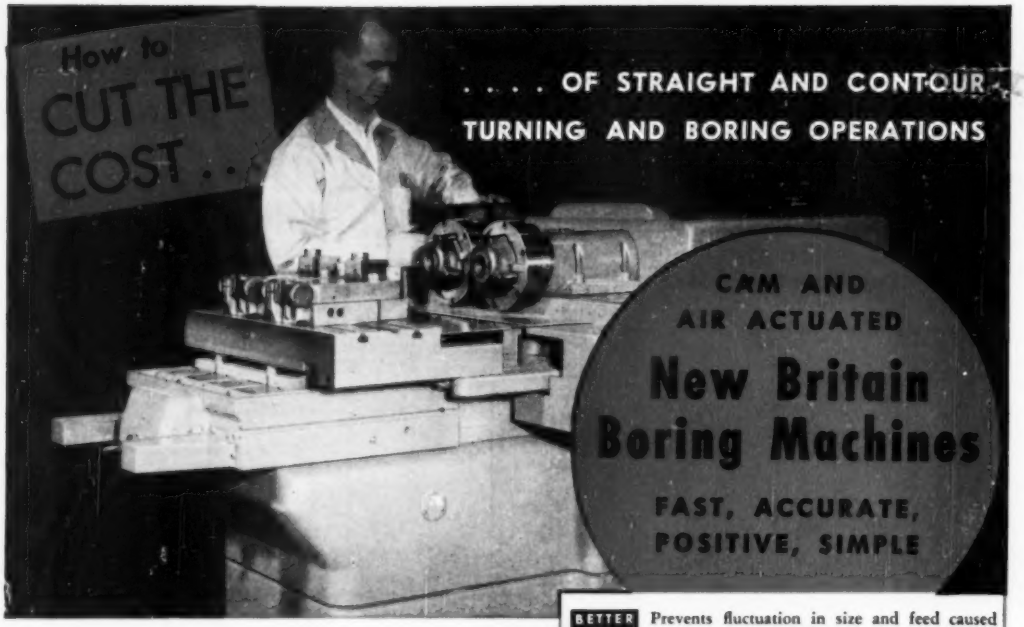
ARMCO
STAINLESS STEELS

ARMCO

Turret-Lathe Machining Times...III

Carbide vs. High-Speed Steel Selection Chart



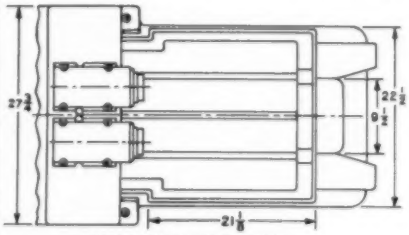


Generate straight bores, outside diameters and an unlimited number of different contours. Adaptable to both roughing and extreme precision finishing of pieces, limited only by the minimum diameter of the boring bar, and on large work by the table size. Operate at top spindle speed of 7500 R.P.M. Two speed drive makes it possible to change spindle speeds for different portions of the same job, to provide for differences in diameters and interrupted cuts.

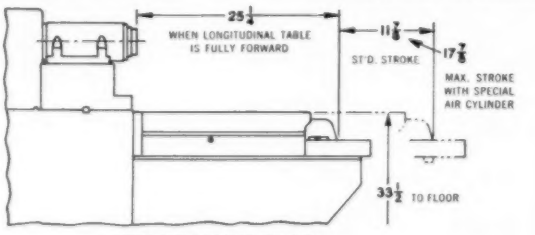
Available in two sizes of two different models, one for straight boring and turning, the other equipped with contour table. One or more spindles may be mounted, and raised, lowered or spaced as required. Vertical cross slides optional for facing or other cross working operations.

- BETTER METHOD — Prevents fluctuation in size and feed caused by temperature variations.
- BETTER METHOD — Only one single point tool to buy, set, adjust and grind.
- BETTER METHOD — Holds .0001 tolerances by reducing tool strain and work torque.
- BETTER METHOD — Positive cam actuation reduces inspection to a single dimension.
- BETTER METHOD — Rapid traverse to within a few thousandths of work, quick withdrawal, cut idle time.
- BETTER METHOD — Optional automatic loading enables one operator to run more than one machine.
- BETTER METHOD — Choice of tool or work rotating set-up makes tooling easy and flexible.

LARGE SIZE TABLE TAKES BIG WORK | **Besides doing small work, these machines are capable of mounting large pieces on the tables as shown in the following tooling area sketches**



TOP VIEW OF TOOLING AREA



SIDE VIEW OF TOOLING AREA

The work capacity and flexibility of New Britain boring machines open up unlimited possibilities for finding the better production methods on which successful competition stands or falls. Write for full details, and the brochure, "IT CAN BE DONE" which describes actual cost histories on specific jobs.

649MK1

NB

NEW BRITAIN

Automatics

THE NEW BRITAIN MACHINE COMPANY
NEW BRITAIN, CONNECTICUT

TALKING SHOP

Die-cast Spinner

Harry Markle, imbued with modern ideas in the ancient sport of angling, has produced a spinning reel at the unheard-of low price of $7.95. The secret is mass production—as usual. The spool is an aluminum die casting, produced in a 2-cavity die. Seven other parts are also diecast of aluminum, a full set being made each cycle in a 7-cavity die. Drag on the spool is achieved by adjusting a nut against a steel spring washer. There are only 17 parts in the whole reel—plus an extra spool so line change is simple. Finish is wrinkle paint and weight is only 5 oz. So—even Izaak Walton is going modern.

Blue Time

As an appendix to our report on "Color in the Shop" (*A.M.*, June 2), we may mention that scientific tests indicate that time is generally over-estimated in rooms painted in red tones, underestimated in rooms where the predominant color is blue. Moral: Paint the planning department blue, but the men's room red.

Faith in the Product

One of the many products of Republic Steel's Berger Manufacturing Division is voting machines. As these are sold chiefly to municipalities, production is not large, but there are usually two or three on hand. Recently, a union election was held in the plant, and to save everybody's time and avoid any suspicion of monkey business, ballots were cast on the machines; probably the first time a plant union vote has been so handled.

Flatter Stampings

ROLLER LEVELERS of special design are being used to flatten lamination-like stampings 2½ in. OD x 0.025 in. thick. The operator drops stampings into the machine, where they are flattened to such an extent that crowning is less than 0.0005 in. Stacked pieces show no daylight.

Standard—But Special

STANDARD UNITS, cleverly combined, can frequently produce very useful special equipment. Example: A dial-type staking machine that assembles 7000 items per day is made up of a drillpress, powered dial fixture, a stock timer for the staking (drillpress) spindle and air-operated pedal controls. The operator has efficiency bins in front of the table, from which she removes assembly components and loads them into the fixture nest in front of her.

Advantages of Progress

A Pennsylvania RR. executive said recently: "It takes five minutes to discover what is wrong with a steam locomotive, and five hours to fix it. But with these diesels, it takes five hours to find out what's wrong, and five minutes to fix it." He was referring to a holdup of 4½ hr. on the crack flyer, the "St. Louisian"—because a pair of wires crossed where the insulation chafed through.

Sunshine

Gene Flack of Sunshine Biscuit delivered several rays of sunshine with his major address at the 33rd annual dinner of the American Gear Manufacturers Assn. in Hot Springs June 7. Among them: ECONOMIST: one of God's frozen people; a financier without money. OLD MAN: one who can't take "Yes" for an answer. HUSBAND: sweetheart with the nerve removed. 1948 ELECTION: greatest reversal since Serutan—when the polls went to the dogs. BRIDE: gal who cries, when her husband goes out shooting craps, because she doesn't know how to cook 'em. Mr. Flack supported factually his contention that 1949 will be an excellent business year, but goods now must be SOLD. As he put it, "We can't make footprints on the sands of time by sitting down."

No Burrs

TO AVOID BURRS on precision stampings, one toolmaker shears the punch into the die opening, polishes the die opening to a mirror finish, then *lightly* peens the punch face. Die and punch are fastened directly to platen and ram (no dieset). Clearance between punch and die is so close that no burr is thrown up.

Higher and Higher

Increase in higher education is indicated by the fact that last year 9,264 BSME degrees were awarded (29 to women), 619 master's degrees and 22 doctorates. Not too many years ago, an MSME was considered a pure waste of time.

Optical Specs

PRECISION LAPPING is being applied to parts of many metals besides steel. Die castings of brass, bronze and aluminum are now being finished to precision specifications for lapped surfaces in terms of bands, as seen with the optical flat.

Grinding Wheels

Heinz Landauer in Tampa is a student of the incongruous. His latest efforts deal with grinding. He reports that manufacturers are now producing grinding wheels so cool-cutting that parts must be heated to prevent grinding undersize from the excessive temperature drop. Also that the open-structure grinding wheel of the future will consist of pores rather than abrasive grains, so it will have to be sold by weight. Lastly that the secret of the long-wearing grinding wheel is that it grows during use—hence must be dressed frequently to keep it down to original size.

New Shop Equipment

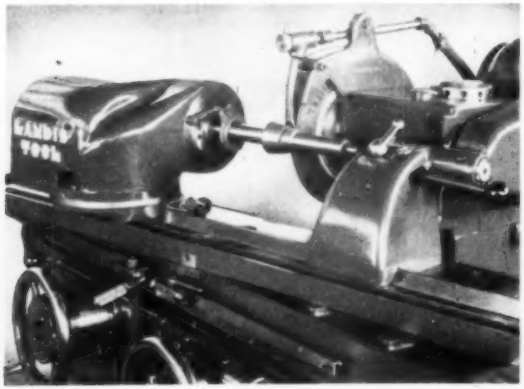
Cylindrical Grinder Will Swing 12-in. Work

1 *Grinder has 28-in. capacity between centers. Floor space required is 51x105½ in. Standard wheel size is 12x¾x3 in.*

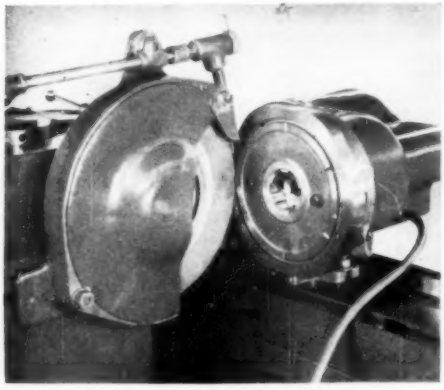
THIS low-priced general-purpose cylindrical grinding machine called Grindwell can be used for small-lot manufacturing purposes in shops, toolrooms and for training purposes. Machine will swing 12-in. dia work, and is equipped with a 12-in. dia grinding wheel powered by a 1-hp spindle. Microsphere bearings are used and are self-aligning, babbit-lined, one-piece steel. A graduated swivel base permits swiveling the wheel head for unusual grinding setups or for truing an angle on the wheel face.

Headstock has an infinite speed range from 85 to 483 rpm, with a rheostat control. There are two revolving parts—motor spindle and faceplate. Either live or dead spindle operations are possible by moving a lever. Base is mounted on a graduated swivel for setting up angle- or face-grinding operations.

Power traverse is supplied with four speeds available. Two-speed hand traverse is standard: slow speed for grinding fillets or shoulders, fast for setup. Table can be swiveled for taper grinding. A scale, graduated in degrees and inches per foot, permits accurate settings. Beds are normalized castings, and are made with a reservoir for coolant with settling baffles and a sloping clean-out lip. Both coarse and fine wheel feed are provided. Guides and surfaces of the swivel table, carriage, and wheelbase are precision

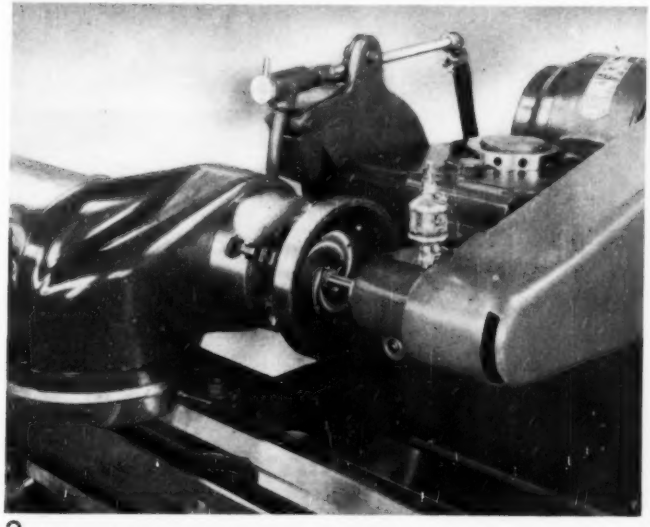


3 *Steep taper is ground by swiveling worktable. Note support pad under table*



4 *Precision face grinding is done by swiveling headstock 90°, attaching work to faceplate*

Materials and Parts

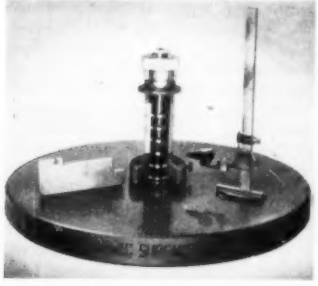


2 *Machine grinds bore of an internal gear ring. Work is held in 4-jaw chuck*

ground. Bed guides are hand scraped.

Specifications are: maximum work swing, 12⅜ in, maximum distance, work to wheel center lines, 12¼ in.; minimum distance, 3¾ in., height from floor to work center line, 44⅜ in.; coolant reservoir capacity, 15 gal.; traverse speeds, 12, 23, 43, and 85 ipm. Swivel table is graduated to grind 24° taper included angle, and 5 in. per ft included angle. Grinding wheel head swivels 90° each way. Specifications for internal fixture-fixed: Minimum diameter of hole, 9/16 in.; maximum depth of hole with standard quill, 2 in.; motor 1 hp; speed, 11600 rpm.

Landis Tool Co., Waynesboro, Pa.



Norton Ceramic Surface Plate Finished to Within 0.0001 In.

This ceramic surface plate is designed for toolroom and inspection use with precision set-up and checking measurements which require a high degree of accuracy. This plate offers extreme wear resistance, a precisely flat surface guaranteed to be within 0.0001 in. up to 24 in. in dia, and a continuously smooth surface finish. Field trials have shown that the plate will not warp or deform, give expansion troubles or deflect under load. Its smooth semi-glossy surface is neither slippery nor sticky. Its accuracy permits exact duplication of readings. The plate is non-magnetic and will not sweat or corrode under atmospheric conditions. It may be cleaned with soap powder and water. Flatness combined with smoothness shortens time required for readings.

Norton Co., Worcester, Mass.

...INCLUDING

Single-spindle automatic with five-faced overhead turret controlled by trip blocks for feeds, spindle speeds, length of stroke, skip indexing.....page 126

Automatic quill-type machine with size control hones 250 valve guides per hr.....page 127

Self-contained plating machine with temperature and current control delivers to 300 amp. page 128

Bench shear cuts sheet, bar stock to 1/16 in. thick, any length, any width.....page 132

Fast-cutting Bessemer-steel bar stock comes in hot-rolled bars, cold-finished forms.....page 136

Multi-tumbler finishing machine with circular mounting plate deburrs, polishes 15 different items simultaneously.....page 138

Profile-measuring microscope compares enlarged projected image with enlarged outline drawing .....page 138

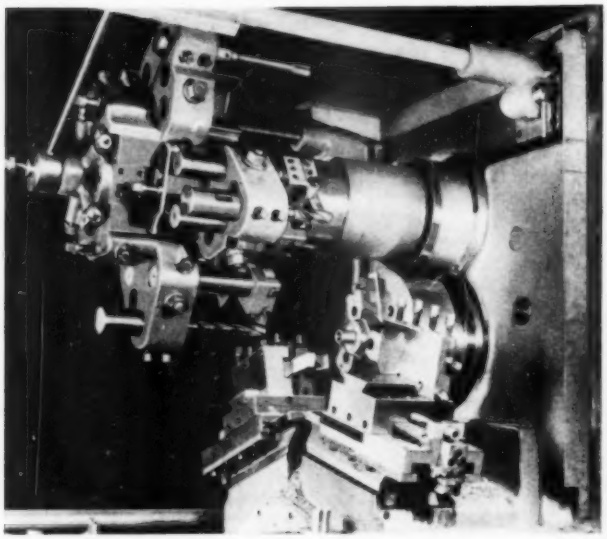
NEW BULLETINS for Your Shop Library includes Booklet, "Safe Speeds for Grinding Wheels," gives established rules for efficient operation....after page 170

...and in JULY 14

Cylindrical grinder handles work by infeed method, holds roundness, without centers or chuck, within 0.000025 in.

Utility shaper using carbide tools cuts at over 250 fpm on 10-in. stroke.

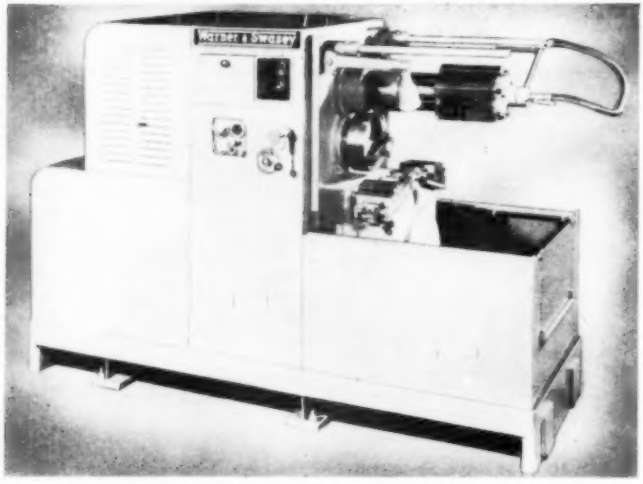
Semi-automatic multiple-turning lathe operates on rack-and-pinion feed.



1 *Five turret and two cross-slides provide large tooling capacity. Cross-slide tools are adjustable longitudinally and transversely.*

2 *Trips select feeds, speeds, cutting stroke, skip indexing, top. Pentagonal turret is shown, bottom.*

Automatic Has Five-Faced Overhead Turret



3 *No cam changes are necessary on the 1-AC machine. Machine is shown without roller-mounted transparent plastic splash guards.*

THIS single - spindle automatic chucking machine features front and rear cross-slides and a five-faced overhead turret, handling work up to 8½ in. in diameter and up to 6-in. turned length.

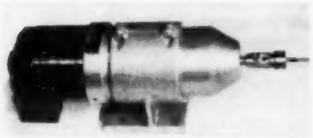
Trip-blocks are set in slots on a pentagonal drum at the rear of the turret shaft to control feeds, spindle speeds, length of cutting stroke and skip indexing. Either or both cross-slides can be selected to operate with any or all turret faces, and an Allen wrench adjustment controls late and dwell cross-slide operation. Permanent cams are used for both turret and cross-slides. Only two bearings are used on the turret shaft for maximum rigidity. Bearings are inclosed.

Customary tool overhang on larger diameter work is eliminated because of the overhead turret. As work-diameters increase, tools are brought closer to the guiding ways. Chips drop directly into a large pan below the spindle and can be removed while machine is in operation.

Setup controls include feed and speed selectors, automatic and hand operation switches, and forward, reverse, and index pushbuttons. Spindle-speed range is from 56 to 1498 rpm, and eight speeds are available from any given change gear setup, as a result of four automatic changes and a high-low shift lever. Eighteen feeds are available, from 0.002 to 0.083 in., and three are automatically available during operation for each gear setup. All change gears slide on splined shafts, and the machine cannot be started without gear-box covers in place. Rapid traverse and indexing brake permit fast approach strokes without danger to tooling.

Pentagonal turret is accessible for setup and adjustment. Turret tools can be adjusted at end of any cutting stroke. Controls for setup and hand operation are separate from the automatic controls.

Warner & Swasey Co., 5701 Carnegie Ave., Cleveland 3, Ohio



Tapping Unit Features Automatic Forward, Reverse Movement

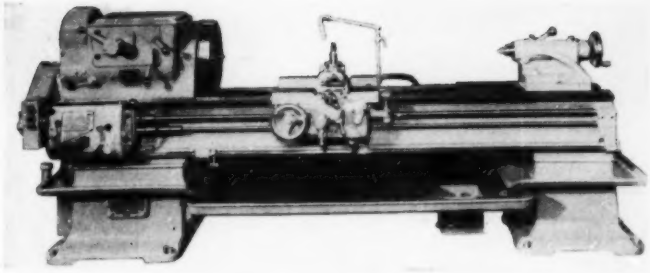
This automatic tapping unit has automatic forward and reverse movement of tap or external threading die, and can be mounted in any position and operated from remote electrical controls. Unit is capable of handling any size tap or die from 0-80 to ⅜-16. A hardened and ground lead screw projects the tap or die throughout the entire cycle of operation. Blind hole tapping to accurate depth is possible. The unit can be operated as many as 30 times a minute without overheating and is equipped with either Morse taper in the spindle or Jacobs Rubber Flex tap chuck.

Precision Thread Engineering Co., 2540 Park Ave., Detroit 1, Mich.

Multi-Rectifier Power Supply For 220-, 440-v Operation

The high-amperage electroplating rectifiers are designed for operation from 220- or 440-volt, 3-phase ac. The MR1 Multi-Rectifier incorporates six selenium rectifier sections which may be interconnected to provide a choice of four dc ranges: 0 to 8 volts, capacity 100 amp; 0 to 16 volts, capacity 50 amp; 0 to 24 volts, capacity 35 amp; 0 to 48 volts, capacity 18 amp. Custom-built units are available with special features.

W. Green Electric Co. Inc., 134 Cedar Street, New York 6, N.Y.

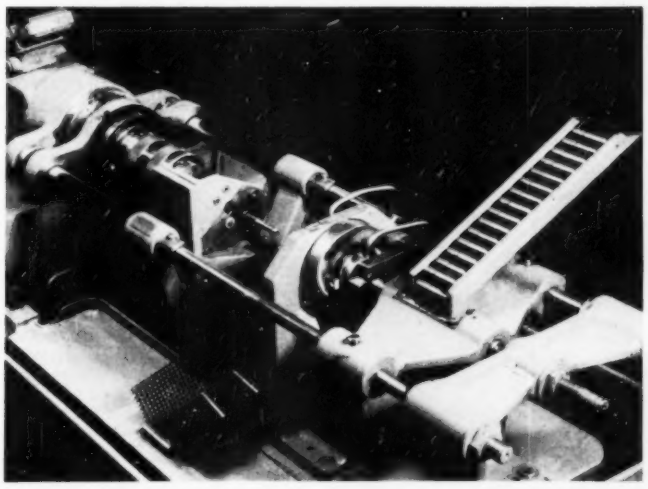


Springfield Engine, Toolroom Lathes Have Sixteen Spindle Speeds

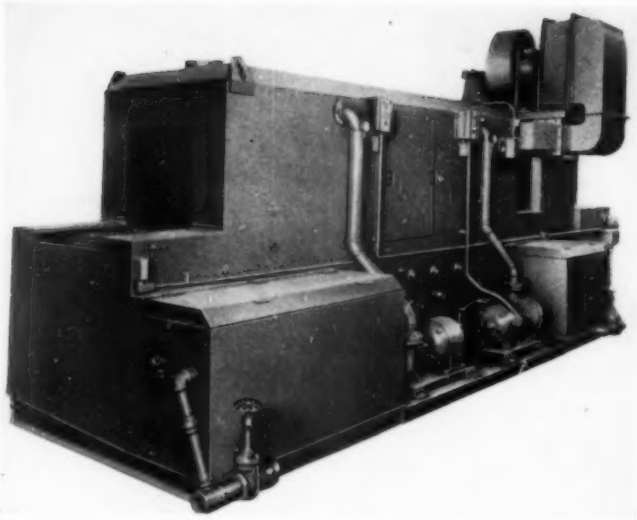
Springfield lathes are offered with 16 spindle speeds, increased horsepower capacities, and several optional speed ranges for coverage of work requiring slow speeds for heavy types, as well as high speeds for carbide tooling.

Three-lever gear shifting system is designed without any pass through gears. Shifting levers are arranged to require a minimum amount of shifting for a normal sequence of lathe operation. Headstock lubrication oil sump has been located in cabinet leg instead of headstock to minimize heat rise. A newly designed feed box incorporates lifetime-lubricated sealed ball bearings wherever possible. Sixty threads and feeds are available with optional ranges that include 11½ and 27 pitch thread leads in addition to other standard pitches. Double cam-actuated friction feed clutches assure positive engagement of feeds. A new design of simple chasing dial is standard equipment, and large micrometer dials are furnished on both cross-slide and compound. Tailstock is heavy-duty type with long table travel. Accessories are available for broader scope.

Springfield Machine Tool Co., Springfield, Ohio



HONING MACHINE is automatic, quill type adapted to hone valve guides. Guides are straight and round; size is held within 0.0003 in. on diameter. Production is 250 parts per hr. Guides are loaded into a magazine. As each part is finished, it is ejected and next part is loaded automatically into collet fixture. Quill moves forward and another part drops into loading position. At forward end of next stroke, tool starts rotating and Microdial control expands tool. When bore is to size, Microsize control ends cycle by collapsing tool and withdrawing it from bore.— *Micromatic Hone Corp., Detroit, Mich.*



Detrex Spray Washer Features Standardized Construction

This series of metal parts washers feature standardized construction so that multiple-wash, rinse and dry-off stages can be incorporated at minimum cost. They are designed so that if only spray stages are installed originally, a blow-off stage can be added at a later time. These machines, WB-100-S single-spray-zone unit and the W-200-S two-spray-zone unit, can be used as standard metal-parts washers for ordinary alkali cleaning compounds, or can be converted to handle compounds which have a tendency to foam excessively.

Work is pressure-sprayed with cleaning solution from rigidly supported multiple-spray headers. Spray nozzles are accessible for cleaning and are adjustable so that they may be directed to any given point—top, bottom and sides. Spray headers are provided with removable plugs for easy cleanout. The blow-off stage, for both the single and double-spray-zone machines, may be steam or gas heated, or built to give a cold-air blast. Position of each blow-off nozzle is adjustable.

Detrex Corporation, Detroit 32, Mich.

Rockwell Cro-Plater Is Self-Contained Plating Machine

This Cro-Plater is a complete plating unit, wired and ready for operation on delivery. The machine is designed primarily for all types of chromium plating. It is provided with a lead-lined Armco iron tank, and can deliver required amperage up to 300 amps under precision control, not only of current, but of temperature. The unit is equipped with a blower which exhausts fumes from the tank, and force-cools the copper oxide rectifiers.

Cro-Plater can be used for other metals where the standard lead-lined tank is suitable. Plain steel, rubber-lined or other types of tank construction can be provided. Cro-Plater is made in one standard size, with a 45-gal. lead-lined iron tank, 24x18x30 in. electrically heated by a thermostatically controlled unit, located outside and at the bottom of the tank. A bank of six force-cooled copper oxide rectifier stacks delivers up to 300 amp at 1 to 15 volts for the plating operation. Accessory equipment includes a vapor degreaser unit for removal of organic dirts, and a cleaning unit for removal of inorganic salts and solid dirts.

W. S. Rockwell Co., 200 Elliott St., Fairfield, Conn.

Hand-Rotary Abrasive Finisher Available for Buffing, Drilling

This Disc-ette electric hand rotary abrasive finisher is a scaled-down version with utility kit for buffing, drilling, hole polishing, etc. The Disc-ette, weighing 3 lb, can be held in one hand. Special hand grips have been purposely eliminated; Disc-ette is grasped directly around housing.

Specifications are: electric motor —110 v ac, 60 cycles 115 volts dc, 1/15 hp at 9000 rpm; driven disk or tool speed 4500 rpm; housing diameter 2¼ in.; total weight 3 lb 2 oz.

Craft Hollow Industries, Wallingford, Pa.

Improved Boring, Facing, Grooving Tools Available in Six Sizes

Improved boring, facing and grooving tools are available in six sizes with power-feed facing. The Model J is designed for use in the small machine such as Moore, Index, Bridgeport, etc. The Models D and 1½ and 2½ for the medium and semi-heavy type machines, and the model 3½ and 4½ for the heavier machines, are provided with the power-feed facing feature. Positive slide stops limit slide travel. Interchangeable shanks are available.

Chandler Tool Co., 514 Ohio Ave., Muncie, Ind.

OMEGA makes the CHIPS FLY

...even on tough stainless castings

Ranging up to ⅜-in. thickness, these chips shown in actual size were gouged with relative ease from Type 410 stainless steel castings heat-treated to 250 Brinell. This low-carbon, 12 pct chromium steel is extremely tough, yet there was no apparent injury to the cutting edges of the Omega chisels. The severity of this chipping operation is indicated by the spots of temper colors on the highly-glazed undersurface of the chips. Omega is engineered for just such brutal shock jobs.

Tough is the word for Omega. It thrives on cold-battering jobs where you've got to have a tool steel with super shock-resistance. And Omega has a normal working hardness of 55 to 59 Rockwell C at cutting edges; that's hard enough to *hold* a sharp edge on even the severest kind of shock jobs.

Use Omega for tools like these:

Chipping chisels	Core breakers
Calking tools	Shear blades
Punches	Beading tools
Rivet busters	Swaging dies

Long a toolmakers' favorite for general-purpose shock tools and machinery parts, this fine silico-manganese steel combines ductility, toughness and hardness. There's no better steel for withstanding drastic shocks at normal temperature. It's economical; and it's easy to forge, machine, and heat-treat. Give Omega a trial, as rough as you like. The nearest Bethlehem tool steel distributor stocks it for quick delivery.

THESE PROPERTIES MEAN SHOCK-RESISTANCE

Unnotched Charpy	130 foot pounds
Tensile strength	340,000 psi max
Yield point	280,000 psi max
Hardening, 1625 F, oil quench; 1550 F, water quench	
Tempering	400 to 650 F, Rockwell C 59-55

Analysis	C	Mn	Si	Mo	V
	0.60	0.70	1.85	0.50	0.25

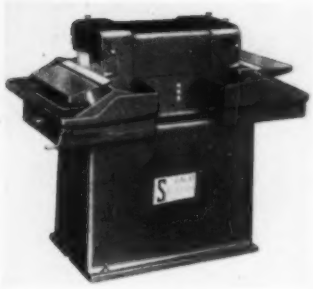
BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor:
Bethlehem Steel Export Corporation

BETHLEHEM STEEL

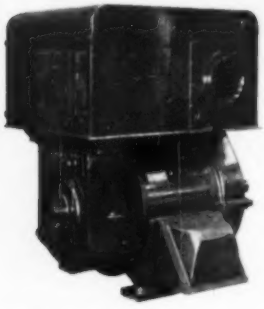
OMEGA one of Bethlehem's Fine Tool Steels



Two Carbide-Tool Cutters For Wet, Dry Grinding Have 1, 3 hp

Two carbide-tool grinders for wet or dry grinding feature vibration-free construction and are V-belt motor driven. They are available in 1 and 3 hp. Motors are reversible and totally inclosed. Three-button push-button and reversing magnetic starter has overload and under-voltage protection. Worktables are adjusted to any angle (15° above and 30° below the horizontal) with graduated dial. Table assembly, guard and splash pan are adjustable through screw feed to compensate for wheel wear. Each table is equipped with replaceable steel wear plate. Adjustable nozzles supply coolant for wet grinding. Conversion to dry grinding is accomplished by closing coolant valves, opening gates at each wheel and connecting to exhaust system at rear of grinder.

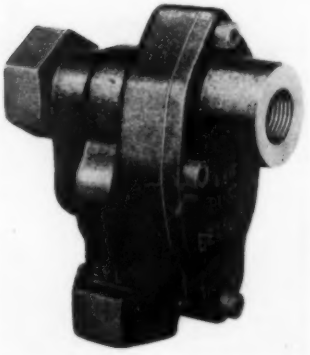
Standard Electrical Tool Co., 248 W. 6th St., Cincinnati 4, Ohio



GE Unit-Cooled dc Motors Have New-Type Cooling System

Unit-cooled dc motors are offered with a new cooling assembly enabling them to operate at slow speeds for longer periods of time. Two blowers driven by a single GE Tri-Clad induction motor, in the air-to-air cooling assembly provide ventilation independent of motor speed. One blower circulates internal air through the motor and unit cooler, while other blows external air through the cooler. This system makes full torque possible down to almost zero speed continuously. Motor air never comes into contact with the contaminated outside air.

General Electric, Schenectady 5, N.Y.



Ross Quick-Exhaust Valve Speeds Cylinder Return

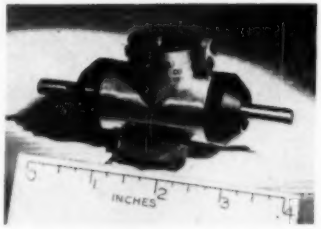
A quick-exhaust air valve enables cylinders to start their return stroke in a split second. The quick-exhaust or dumping valve acts as a supplementary exhaust to the regular operating valve. When the latter is in open position and starts to exhaust, it automatically causes the self-operating dumping valve to dump the exhaust air thus permitting cylinder to start its return trip almost instantaneously. This feature makes the dumping valve ideal for close-coupling on machinery where quick cylinder return increases safety and improves performance. Valve effectively offsets the distance factor since it releases the air right at the cylinder. It is available in $\frac{3}{8}$- to 1-in. pipe sizes.

Ross Operating Valve Co., 120 E. Golden Gate, Detroit, Mich.

Revolving Stops Available For Turret Lathes

Two sizes of revolving stops are offered for use on turret lathes and larger-type screw machines. Sizes are 4RS-$1\frac{1}{2}$-in. shank and 5RS-$1\frac{3}{4}$-in. shank. Stops are precision made of high-quality materials hardened to withstand repeated impacts. Internal ball race is inclosed to prevent entrance of chips and foreign matter.

Boyar-Schultz Corp., 2110 Walnut St., Chicago 12, Ill.

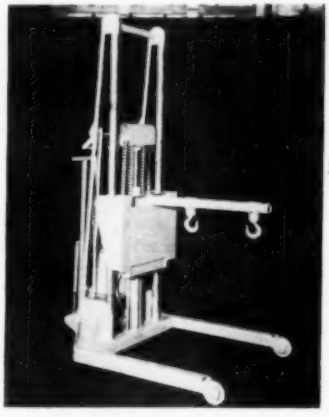


Miniature Adjustable Speed Drive Weighs Less than 6 Oz

The Miniature variable-ratio speed changer weighs less than 6 oz and can be hidden inside your hand. It delivers up to 70 oz-in. torque and 0.025 hp. Possible applications include business machines, recorders, controllers, indicating mechanisms and similar devices. Ratio of input to output speed is infinitely adjustable between 1:6 increase and 6:1 decrease, with a total speed range of 36 to 1.

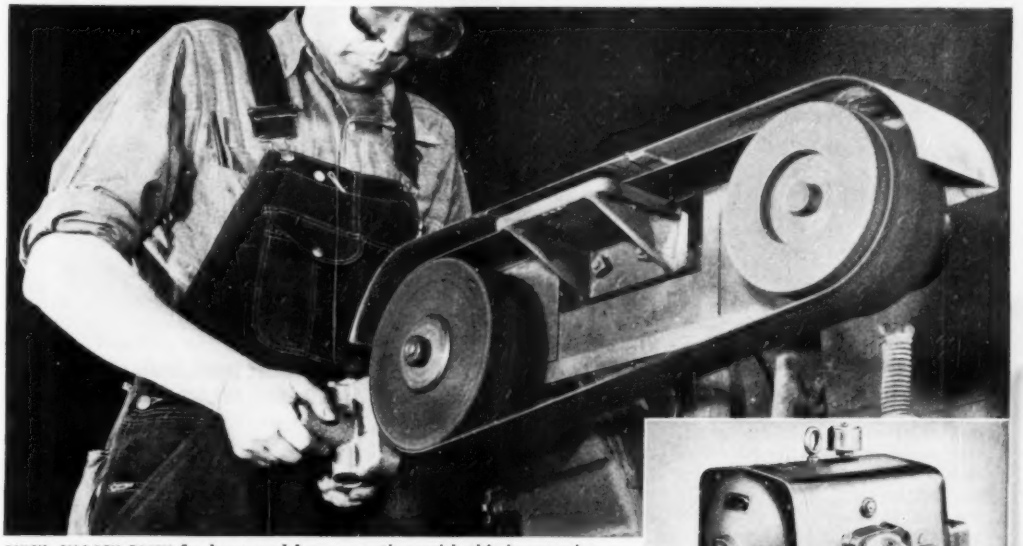
A dial and pointer indicate ratio settings and the adjusting knob is equipped with friction drag to prevent ratio wander. Maximum output torque is obtained at zero speed and operating speeds as high as 20,000 rpm are practical.

Metron Instrument Co., 432 Lincoln St., Denver 9, Colorado



SPECIAL TRUCK handles delicate but heavy 300-lb electrical instrument assemblies. Truck features a hydraulic elevating boom which elevates from 16 to 70 in. For packing operation truck is moved into position so that boom is directly over assembly to be packed. A special sling arrangement to lift assembly is fastened to two hooks suspended from boom. Load is lifted by means of a hand pump actuating a hydraulic hoist—*Lyon-Raymond Corp., 1976 Madison St., Greene, N. Y.*

ANOTHER 3M COMPANY SERVICE STORY



QUICK, SMOOTH FINISH for brass and bronze castings with this inexpensive bench backstand grinding unit. Tri-M-ite Cloth Belts backed with a "K" Contact Wheel have speeded metal finishing over three times as fast as previous equipment.

OILGEAR 35 HP TWO-WAY VARIABLE DELIVERY PUMP—typical of the products being turned out *faster* with the help of belt grinding.

Belt grinder pays for itself in one month!

When a 3M Methods Engineer suggested a bench backstand grinder for grinding and finishing brass, bronze and steel castings, steel plates and bar stock at The Oilgear Company, Milwaukee; he may have used the familiar phrase, "It'll pay for itself."

This large user of steel plates, bar stock, forgings and castings gave our Engineer a chance to prove this statement . . . and the equipment saved its original cost during its FIRST month of operation.

Recapturing the cost of a unit of plant equipment in one month is unusual, but we can point out hundreds of users throughout the country who have cut grinding and finishing costs and stepped-up production three to four times over previous methods.

If you grind or finish metals, plastics, wood or glass, flat or contoured surfaces, you'll want more information on this production line cost-cutter—Belt Grinding. The coupon below will bring you an informative booklet and, if you like, the services of a 3M Methods Engineer to help analyze your operations. No obligation, of course.

Made in U.S.A. by MINNESOTA MINING & MFG. CO., *St. Paul 6, Minn.*
Also makers of "Scotch" pressure-sensitive tapes, "Underseal", "Scotchlite", "3M" Adhesives.

Please send me a copy of your booklet "Step Up Production".
Please send a 3M Methods Engineer to call on me.

AM-649

*Name*_____

*Firm*_____

*Title*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

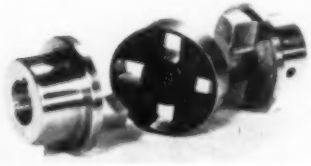
3M ABRASIVE BELTS

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.* *In Canada:* CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

2-kw Induction Heater Speeds Soldering, Brazing

This ultra fast 2-kw induction heater allows operator to hold work in hand in complete safety. Work can contact the heating coil with no danger of electric shock and without upsetting the fast uniform heating action of the high-frequency field. Heater uses vacuum condensers as well as vacuum power tube. Although the current flowing in the heating coil is high (100-200 amp) the operating voltage in the new circuit is low (10-20 volts). The heating operation is completed in a few seconds so that heat does not have time to travel more than $\frac{1}{2}$ in. down rod. All controls are concentrated in upper quarter of front panel leaving the center panel clear for work fixtures. Work height of the new Sieco induction heater permits direct combination with the company's automatic turntables for high-production soldering, brazing or heat-treating setups.

Sherman Industrial Electronics Co., 505 Washington Ave., Belleville 9, N.J.



Synthetic Rubber Spider on Flexible Coupling Absorbs Shock

This flexible coupling has a steel-banded synthetic-rubber spider which will carry heavy loads under severe operating conditions without thrust on the driver or driven, and without distortion, back lash, or chatter. The extra-large synthetic-rubber spider, which stands high temperatures and is resistant to oil, provides maximum shock absorption and resists higher torque.

The steel retaining ring, molded and bonded to the synthetic rubber spider, prevents distortion and dissipates heat generated by misalignment. The steel spider ring also allows coupling to operate at high speed without damage or breakdown. The three-piece coupling compensates for parallel and angular misalignment, needs no lubrication and runs in silence.

Estey Co., 547 N. Main St., Canandaigua, N. Y.

Carbon-Steel Adjustable Wrenches Have Thin, Tapered Jaws

This line of carbon-steel adjustable wrenches have thin tapered jaws. They are made in 4-, 6-, 8-, 10-, 15-, and 18-in. sizes with maximum capacity from $\frac{1}{2}$ to 2-1/16 in., and are drop-forged. Wrenches have Williams patented sliding jaw feature. The square shoulders on the shank portion provide positive bearing against working stress. Wedging and spreading action is eliminated.

J. H. Williams & Co., 400 Vulcan St., Buffalo 7, N.Y.

Silicone Insulating Resin Withstands Temperatures to 180 C

This silicone insulating material is designed to enable electrical equipment to operate at temperatures as high as 180 C. Listed as No. 9989-1 resin, the tough thermosetting insulation has general application for impregnating spun-glass and asbestos-wire coverings and for binding coils, windings, and other motor, generator, and transformer parts. It is said to have good dielectric strength as well as superior heat and water resistance, and is said to dry tack free in less than 30 min. at relatively low temperature. It can be cured to a tough flexible film. Material is used as supplied or can be thinned with petroleum spirits or VM & P naphtha.

General Electric Co., Pittsfield, Mass.

Hercules Bench Shear, Rod Cutter Handles Bar Stock to 1/16 In.

Hercules No. 0 bench shear and rod cutter is a general-purpose tool that can be adapted for production purposes as well as for making samples and templets in tool and die work. Cutter shears sheet and bar stock up to 1/16 in. thick, any length and width; cuts rods square without burrs, up to $\frac{1}{4}$-in. dia; notches out templets and other odd shapes; cuts circles from $1\frac{1}{2}$- to 10-in. dia; automatically ejects cut rods. Interchangeable shear blades are high-grade tool steel made of aluminum alloy. Models Nos. 1 and 2 shear sheet and bar stock up to 3/16 in. and cut round rods up to $\frac{1}{2}$ in.

Manufacturers Products, Crest Ave., East Haven, Conn.

Mikro Marker Is a Micrometer Precision Height Gage

A micrometer height gage, the Mikro Marker, can be used for layout and for gaging applications. The micrometer reading range is from 0 to 1 in. by thousandths. No vernier is used. Price $12.

Metal Items, 820 Sixth Street, Racine, Wis.

EASIEST OF ALL SHEARS TO OPERATE

"EASIEST of all Shears to operate" are not just our words. They are words of operators being heard with increasing frequency as more Steelweld Shears are placed in plants throughout the country.

Men who have worked for many years on shears of various makes and know them through and through are acclaiming the many features incorporated into Steelwelds — features that ease their work, speed production and make for greater accuracy and minimum maintenance.

Steelweld Shears are entirely new machines designed from scratch as such. They are not a variation of or an adaptation to any previously existing machine. The designers of these new shears were free to incorporate all ideas and features that would result in better machines. They were not hampered by tradition or previous designs or models.

As a result Steelweld Shears are radically different with advantages never before possible.

Whether or not you are in need of a shear at this time, if you work plate in any thickness up to 1¼-inch or length to 18 feet, we urge you to get more data on these modern machines. Keep informed — send for the catalog below.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

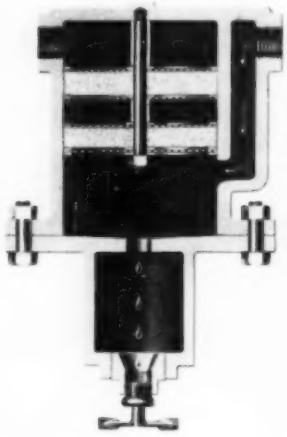
1405 East 282nd Street, Wickliffe, Ohio

STEELWELD PIVOTED BLADE SHEARS

Mechanical Improvements Offered on Clark Fork Trucks

The redesigned Clark Trucloader fork truck has a 1000-lb capacity. Trucloader follows the lines used in the new Carloader model. Truck's gas tank is now attached to the rear of the frame and is partially inclosed by the counterweight. The counterweight has been redesigned to more rounded contour, and additional weight provides added stability. Steering column has been moved forward to provide more leg room; and lift and tilt levers have been relocated in the same positions as on other Clark models.

Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.



Compressed Air Separator Removes Oil, Moisture at Point of Use

Compressed air separator removes the last trace of oil, moisture and dirt from compressed air at the point of use. This is applicable in conjunction with such operations as blowing dust from highly polished surfaces or from surfaces subject to corrosion. Installed in pipe line just ahead of point of delivery, air enters the unit at the top right and is conducted to the expansion chamber below the strainer cartridge, where expansion and surface contact separates air and moisture.

The air then rises slowly through two cotton felt absorbent pads, packed between perforated brass baffles. The cotton felt pads trap oil, grit and moisture, and dry clean air is delivered for use. Separated moisture descends by gravity to the moisture collector, where it is held separate from incoming air to prevent re-absorption.

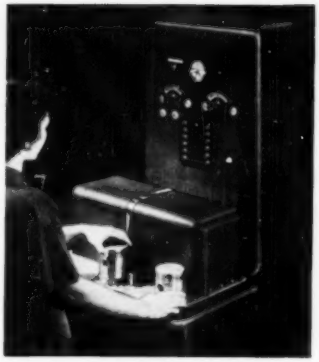
The unit is offered in two sizes. The Murphy Paragon C, Size 1, measures 5¼x8½ in. over-all, accommodates inlet and outlet pipe sizes of ⅛ to ⅜ in., delivers to one ⅛-in. pipe nozzle only, and sells for $28. Size 2 measures 6½x8½ over-all, accommodates inlet and outlet pipe sizes ⅛ to ¾ in., delivers by manifold to four ⅛-in. pipe nozzles or to two ¼-in. pipe nozzles and sells for $39.

James A. Murphy & Co., 5th and Vine Sts., Hamilton, Ohio

Fixture for Sharpening, Grinding Chip Breakers on Inserts

This ejector tool insert grinding fixture is offered for sharpening and grinding chip breakers. Fixture provides clearance for grinding any insert with either flat or dished chip breaker. Two calibrated setting dials provide accurate adjustment in any position and cam indexplates speed grinding of rectangular, square and triangular inserts. Spindle of the fixture is pre-loaded ball-bearing type and is ground after assembly in the fixture to assure perfect alignment.

Super Tool Co., 21650 Hoover Road, Detroit 15, Mich.



Multiple-Station Piston Gage Checks Nine Dimensions

Nine critical dimensions of an automotive piston are checked simultaneously on this specially designed multiple-station piston gage. By using three gaging mediums (Air-O-Limit, Electrolimit, and Multiple Contact) combined into this one fixture, the gaging operations are performed simultaneously. Piston is placed on automatic loading mechanism and operator watches lights and meters on instrument panel.

Piston is drawn automatically into gaging position. Green lights indicate undersize, red lights indicate oversize. Three meters show variations.

The machine checks three-ring groove diameters, top land diameter, dome height, skirt taper, skirt diameter, skirt squareness, and pinhole diameter.

Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford, Conn.

POWER TRUCK retains all features of Jacklift walkie electric truck and adds a through corridor from which operator can control all functions of truck while riding along with it. Riding-type truck is available in platform, pallet and tractor styles, and can be operated from a walking position—*Lewis-Shepard Products, Inc., 210 Walnut St., Watertown 72, Mass.*

BROACH MAINTENANCE OPERATIONS

A RESHARPENING

Restoring cutting edges that have been dulled from normal use.

B RECONDITIONING

1. Along with normal resharpening, it is often necessary to "recondition" broaches for correct cutting action. That is, "gum out" between the teeth when sharpening has reduced chip clearance beyond working limits.

2. After several sharpenings, and even gumming out, it is sometimes economical to "re-sink" the entire form on form tools.

C SALVAGING

Broken broaches can often be returned to full production duty after salvaging operations. Broken shanks can be repaired by welding, broken teeth can be re-stepped in some cases, etc.

Another important phase of salvaging is the conversion of good broaches to do jobs other than that for which they were originally designed. If engineering or production changes prohibit the use of present broaching tools, perhaps they can be converted to do other operations.

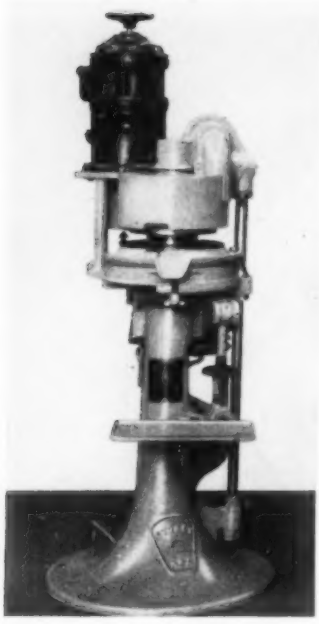
Ever since we designed and made the first set of broaches at Detroit Broach, we have welcomed broaches that were returned to us for maintenance, whether resharpening, reconditioning or salvaging was required. It is just as important to us to keep broaches "on the job" as it is to design, make and deliver new ones. There are advantages to you, too!

To perform any one of the three broach maintenance operations—they're defined at the left—requires proper equipment, inspection facilities and knowledge of broach design. Every broach returned to us should naturally be accompanied by instructions from the customer. In the light of these instructions it will be inspected by one of our engineers. He determines whether or not it is advisable to repair the tool—sometimes it is most economical not to—and if it is advisable, designates what operations are required. These operations are then performed on equipment selected for that purpose—by men skilled in broach maintenance. Finally, the broach is inspected on the finest and most complete broach inspection equipment available . . . following the same detailed inspection procedure used on new broaches.

Many of our customers have always taken advantage of this service because it has proven to save them money. We suggest that you do, too . . . to guarantee the ultimate in broaching production at lowest over-all tool cost.

DETROIT *Broach* COMPANY

20201 SHERWOOD AVE. DETROIT 12, MICH.



Rotary Compressing Machine Handles Abrasive Materials

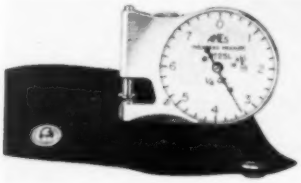
High-speed rotary compressing machine handles abrasive materials such as powdered glass, ceramics and powdered metals. Compressed parts to ½ in. in diameter can be produced at rates up to 300 parts per min on the Stokes B-2X Press. In addition to compressing a wide assortment of shapes and sizes, a special press can be arranged to produce parts having cored holes, etc. With a 1-hp gearhead motor mounted vertically above die area of the press, possibility of abrasive material working into and damaging motor is eliminated. Special guards protect the upper punches from excessive wear. Press applies to 2½-tons pressure from above and below simultaneously.

F. J. Stokes Machine Co., 5900 Tabor Road, Philadelphia 20, Pa.

Craig Dri-Spray Applies at Low Pressure Dry-Powder Particles

The Craig Dri-Spray applies at low pressure individually separated and aerated dry-powder particles for dusting operations with even and uniform distribution and without flotation. It is also used for other processing and manufacturing purposes. The volume of powder that can be sprayed can be regulated, controlled, and adjusted from less than 1 oz to more than 6 lb per hr per unit. It will spray dry powdered resins for making coated fabrics and also for laminated purposes which, after applied are fused with heat. The model P6G Craig Dri-Spray is panel mounted.

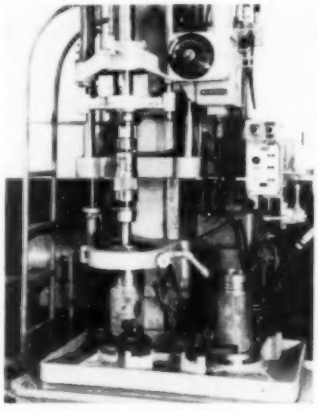
Payne and Craig Corp., 82 Beekman St., New York 7, N. Y.



Dial Thickness Measure Calibrated in Leather Ounces

Another pocket-size thickness measure, calibrated in leather ounces, is the Model No. 25L. New gage can be carried in vest or a watch pocket. It is an aid to leather manufacturers and buyers who must make on-the-spot checks of hides, leather strips and sheeting. Contacts are ¼ in. in diameter and open about 5/16 in. Dial is calibrated in ounces, each graduation equal to ¼ oz.

B. C. Ames Co., Waltham 54, Mass.



HONING MACHINE features the micromatic gage bar Microsize head and tool. Diesel liners 5.750 in. in diameter and 15 in. long are shown being honed and automatically sized on Barnesdril honing machine. Size is held to less than 0.001-in. tolerance; finish, 12 to 16 microinches rms. Production is 25 liners per hr removing from 0.001 to 0.005 in. Hydraulically actuated head automatically compensates for stone wear as it expands and collapses tool for each part—*Micromatic Hone Corp., Detroit, Mich.*

Lighter-Weight Lifting Magnet Utilized with Mobile-Type Cranes

A lighter-weight lifting magnet is used with mobile-type cranes. It weighs approximately 20% less than heavy-duty types and has 39- or 45-in. dia. Both sizes feature Protecto-Weld construction which places the weld on top of the magnet where it cannot be dented in.

Ohio Electrical Manufacturing Co., Cleveland, Ohio

Self-Winding 20-Lb Balance Reel Keeps Portable Tools Within Reach

This 20-lb balance reel is self-winding and suspends portable tools for use on the production line, raising them out of the way when they are not needed. Known as the Zoo self-winding balance reel, it is hung from beam or a cable.

Power tool is fastened to the end of a 6-ft. cable wound on a drum in the housing. Operator pulls the tool down for use, raises it out of the way when job is finished. Reel has twin motor springs for smoothness and safety in case of metal fatigue; worm and worm gear tension adjustment; and separate independent safety cable.

Aero-Motive Mfg. Co., 1803 Alcott St., Kalamazoo 24, Mich.

USS MX Bessemer Steel Bar Stock Provides Faster Cutting

Fast cutting is possible with the MX free-machining steel. When used in automatic screw-machine operations, this steel is said to provide longer tool life and improved surface finish of parts with up to 20% increase in machinability over standard Bessemer steel bar stock of comparable grade. MX free machining steel has been developed specifically to augment the machining characteristics of Grade B-1113 steel. Steel is available in hot rolled bars and in cold finished forms.

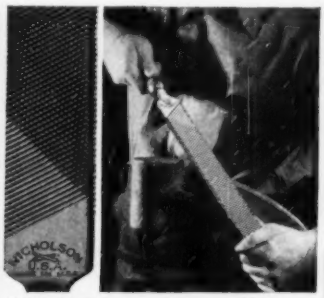
Carnegie-Illinois Steel Corp., 434 Fifth Ave., Pittsburgh 30, Pa.

BETTER WORK AND MORE PRODUCTION WITH THE RIGHT FILE FOR THE JOB

It isn't the cost of the file but the cost of the workman's time that counts in filing operations. Selecting *The right file for the job* is very important. Not only does it save time but it also improves efficiency, reduces rejects, increases production. • Make your industrial distributor of Nicholson or Black Diamond brands a helpful consultant on files as well as your supplier.

STAINLESS STEEL FILE. Special-shape teeth to withstand high abrasive action of the tough chromium carbides and nickel alloy. Same types and sizes as regular-purpose files.

BRASS FILE. Short-angle "upcut" teeth prevent file running off work and keep file clear. Long-angle "overcut" breaks up filings. Flat and Half Round shapes, 8" to 12".



FOUNDRY FILE. Has extra-rugged teeth to resist breaking out. For fast metal removal on castings. Available in Flat and Half Round shapes, 8" to 14".

ALUMINUM "A" FILE. Special serrated-tooth and "open-throat" cut – to prevent clogging. For filing aluminum and other ductile metals. Flat and Half Round, 6" to 14".

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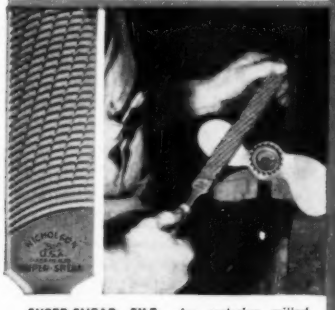
(New, up-to-date edition)

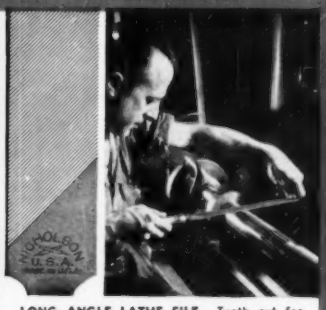
Invaluable to production and purchasing heads, foremen, key mechanics . . . 48 interesting illustrated pages, including HOW TO GET THE MOST OUT OF FILES. Many other features. Most widely used book of its kind.

NICHOLSON FILE COMPANY
Established U.S.A. 1865
29 Acorn St.
Providence 1, R. I.
(In Canada, Port Hope, Ont.)

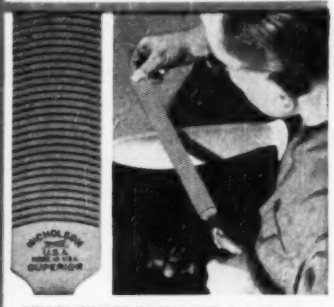
LEAD FLOAT. Has coarse, short-angle teeth – a series of stubby "blades" which shear or "float" away metal. For lead, babbitt, pure copper. Flat and Half Round shapes.



SUPER-SHEAR FILE. An exclusive milled curved-tooth file with teeth in off-center arcs, for roughing and smoothing in one operation. Serrations break up filings. 8" to 14" lengths.

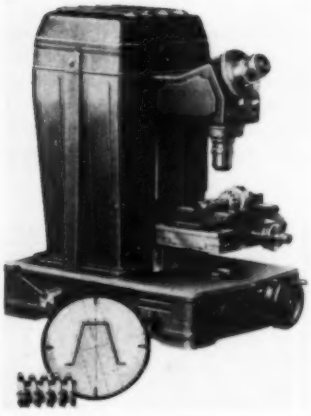


LONG ANGLE LATHE FILE. Teeth cut for clean-shearing–for fast, smooth finishing under light pressure. Made single cut on flat blanks in 6" to 14" lengths.



MILLED CURVED TOOTH FILE. Matchless in workmanship. Proper tooth face and rounded gullets minimize clogging. Shoulders lower than tooth tops permit use as surfacing tool.

NICHOLSON FILES *FOR EVERY PURPOSE*



Profile Measuring Microscope Based on Enlarged Drawings

Profile-measuring microscope for high-precision measuring and control of profiles is based on enlarged drawings. Instrument compares enlarged projected image with a correspondingly enlarged outline drawing of the particular tool, thread, gage, etc., 6, 10, 20, 30 or 50x full size, without requiring special graticules.

Screw threads can be checked for core diameters, pitch, angle of inclination, and form of thread. It can be used for measuring angles, diverse measurement, checking profiles, etc. Drawing for this purpose can be executed to within 0.004 to 0.006 in. assuming a magnification of 30x, the error in the accuracy of the drawing referred to the object is of the order of 0.00012-0.0002 in. For comparison and for the purpose of checking dimensions, only the contour outline of the object is drawn; thickness of the lines does not affect accuracy of measurements. Outlines of the profile drawing or tracing which can be either in ink or pencil, will appear red when viewed through the eyepiece, the image of the object itself appearing green. Illumination and contrast in color can be adjusted within a wide range. Contour lines show up clearly.

The measuring table is 5½x8 in. with rotating glass center; range of measurement of angles with goniometer is 360° reading on vernier, 5 ft.; largest diameter possible of measurement is 3-17/32 in.; microscope comes complete with standard accessories. Two special tool carriers are provided for objects that cannot be placed directly on table.

Hauser Machine Tool Corp., Manhasset, N.Y.

SPECIAL MACHINE with hydraulic feed automatically bores and faces side gear pockets of differential cases. Unit was designed to produce 100 pieces per hr at 100% efficiency. Hydraulic feed and hardened and ground ways are featured. Cycle is automatic. Operator loads and unloads parts and presses cycle button —*The Cross Co., Detroit, Mich.*

Multi-Tumbler for Mass Finishing Handles to 15 Items at One Time

This deburring and polishing machine, known as the Multi-Barrel tumbler for mass-finishing of metal and plastic parts, handles up to 15 different items at one time without mixing, and each can be tumbled in the manner best suited to its requirements. Variables include wet and dry tumbling, wide range of speeds, rotary, centrifugal and end-to-end actions, and combinations of these actions. All degrees of contact and impact can be obtained, and delicate parts which heretofore required deburring and polishing by hand can now be machine-processed without danger of deformation.

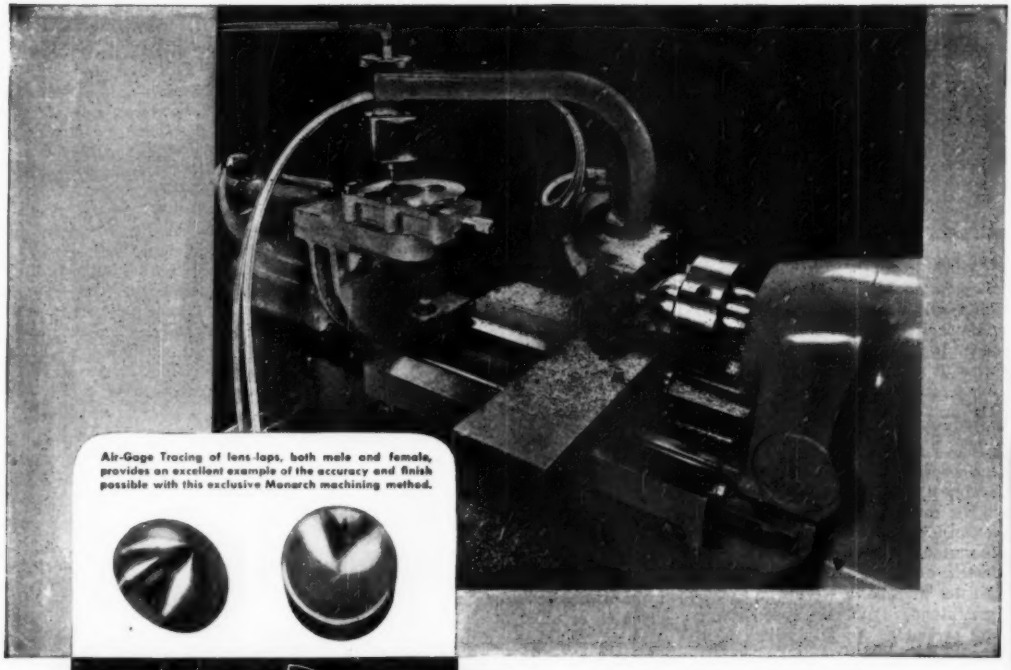
A circular mounting plate with multiple perforations at center and six distances from center for attachment of barrels is rotated at a fixed speed. The barrels, of numerous lengths and diameters, are of round, hexagonal, clover-leaf, or special cross-section, and can be furnished with or without Neoprene lining. Seventy-three standard units are available. They are mounted at right or other angle to the plate. Center mounting produces a mild rotary action, and selective distances from the center add centrifugal action in desired degree.

Hungerford Corporation, Big Flats, N. Y.

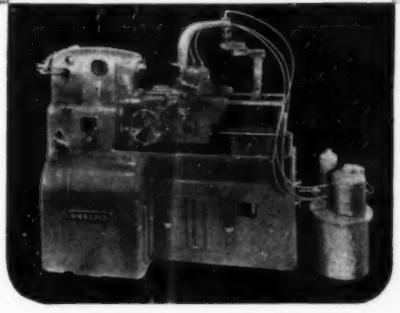
Scotch-Brand Filament Tape Designed with Acetate Backing

A Scotch-brand filament tape is available for heavy-duty packaging. Designed with an acetate film backing instead of paper, the new tape is waterproof, and is thinner than paper-backed filament tape. Caliper of the acetate film tape is 7-9 mils as compared to 13-15 mils for the paper backed tape. Tapes have tensile strength of 180 lb per inch of width.

Minnesota Mining and Manufacturing Co., St. Paul, Minn.



Air-Gage Tracing of lens laps, both male and female, provides an excellent example of the accuracy and finish possible with this exclusive Monarch machining method.



NOW!

All the Advantages of
AIR-GAGE TRACING
Available for
SMALL, HIGH-SPEED WORK

● Here's a new Monarch high-speed contour turning team to *push your costs way down.*

The proved advantages of Air-Gage Tracing now are available on the famous Monarch high-speed 10" EE Precision Manufacturing Lathe.

By the exclusive Air-Gage Tracing method you can turn step shafts; turn, bore and face contours of innumerable kinds. This is done in a fraction of the usual machining time, at a fraction of normal costs—*and with better accuracy and finish.*

Air-Gage Tracing provides an automatic machining cycle and automatic sizing. All cutting is done with a single-point tool and over a wide, stepless range of cutting speeds. Accuracy is assured by the air-gage-like action of the tracer mechanism. Finish is improved; setup time and tooling costs greatly reduced by the single-point cutting method.

If you want peak production at a profit, then you'll want Air-Gage Tracing for your small-parts machining operations. Let us supply you with complete details.

ACCURACY · ECONOMY · LONG LIFE

Monarch TURNING MACHINES

THE MONARCH MACHINE TOOL CO., Sidney, Ohio

FOR A GOOD TURN *FASTER*—TURN TO MONARCH

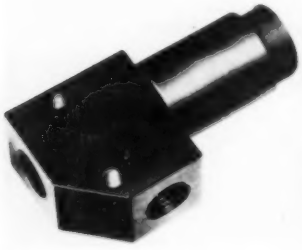
Stepless Speed Control Offered For Fractional-Hp Motors

Stepless speed control is offered for fractional horsepower motors. A simplified circuit is used which makes possible an electronic control system without sacrificing desirable operating features. Operating from either 110 or 220, 50-60 ac power source, the power unit utilizes a full wave gaseous rectification to supply both the armature and field of a specially designed, ball-bearing, dc motor.

The control units which can be at a considerable distance from either the motor or power unit permits selection of desired speed over a range greater than 20 to 1 (80 rpm to 1800 rpm standard). Other speed ranges are available. An idle switch is included on the control unit to start or stop motor without changing speed setting.

Reversing control units are available. Two models include various type motors up to and including ½ hp.

Servo-Tek Products Co., 4 Godwin Ave., Paterson 1, N.J.

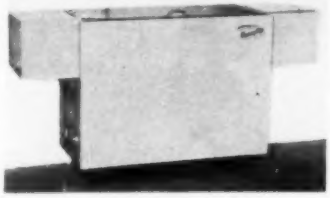


Solenoid-Operated Valve Handles Pressures to 12 psi

This solenoid-operated valve is a lightweight small valve for air or fluids and is suitable for operation over a wide range of temperatures. The Model 10041 is a normally closed, two-way valve designed for continuous duty at ambient temperatures between —65 and +200 F. handling air or fluids at pressures up to 12 psi. Weighing 0.44 lb, it is 3¼ x 1 19/32 in. by 1 in. thick.

Other models, both two-way and three-way, handle fluids or gases at pressures up to 50 psi and can operate intermittently at temperatures as high as 450 F.

Carma Mfg. Co., 2501 E. 103rd St., Los Angeles 2, Calif.

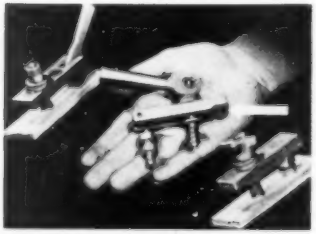


Magnus Cleaning Machine Handles Batches to 350 Lb

This Magnus Krazy Dip Senior is designed for metal-working shops whose volume of parts to be cleaned does not warrant the installation of expensive, automatic cleaning equipment. Machine removes cutting oil and chips, buffing compounds, smut, abrasives or other deposits resulting from stamping, drawing, cutting, grinding or other operations.

Parts are handled in batches up to 350 lb each cleaning operation. The machine is air powered, not air agitated. Mechanical agitation moves the parts in the cleaning solution 160 times per min. Mechanical agitation plus the chemical action of the cleaning solution shears and scrubs the dirty deposits. No heating device, electric motor, speed reducer, belts or eccentrics are used. Air consumption is 1 to 2 cu ft per min and a minimum air pressure of 50 psi is required. Operating cost is said to be approximately one cent per hr.

Equipment Div., Magnus Chemical Co. Inc., Garwood, N. J.



Midget-Type Clamps Hold Small Parts for Machining

Series No. 250 Midget-type clamps have been designed to locate small parts during machining operations. Three models are available, each with a different clamping arrangement. Model CHAC-250 is a heel-cam clamping assembly, Model CCCA-250 is a center-cam clamping assembly, and Model HCA-250 is a hand-knob clamping assembly. All units incorporate the Noble & Stanton cam action which provides for maximum job clearance and fingertip operation.

Clamps can be supplied with either a soft-alloy bronze toe, or a hardened chrome heat-treated steel toe. The soft toe clamps are recommended for gripping finished or ground surfaces while secondary operations are performed. Series No. 250 clamps feature wide range of adjustment at both heel and clamping end. With the exception of the alloy-bronze toe, all parts are heat-treated and hard-chromed.

Noble & Stanton, Inc., 717 Broadway, Bedford, Ohio

Color Filling Machine For Sunken Lettering, Designs

This color-filling machine applies color enamel filling into sunken lettering and design. Design may be flat, curved, concaved or convexed. By hand-operated mechanical means the enamel is carried from a platen shaped to match the surface being filled by means of an Acroprene molded synthetic rubber die. Die is molded to exactly match the design. Machine is listed as Acroprinter No. 301.

The Acromark Co., 7-13 Morrell St., Elizabeth 4, N. J.

Burr-Proof Gage Blocks Eliminate Vulnerability

Each piece of the DoAll 83-piece set is subject to a special stabilizing process to insure against growth, shrinkage and warpage. All amorphous metal and wire edge on gage blocks are removed. The process has no effect on the flatness or accuracy of the gage, and the gage surface is not reduced in area. Measurements of hardness at the edge of the burr-proofed block is 65 Rockwell C, the same as on the gaging surface.

The DoAll Co., Desplaines, Ill.

WHAT'S COOKIN' AT Hotpoint?

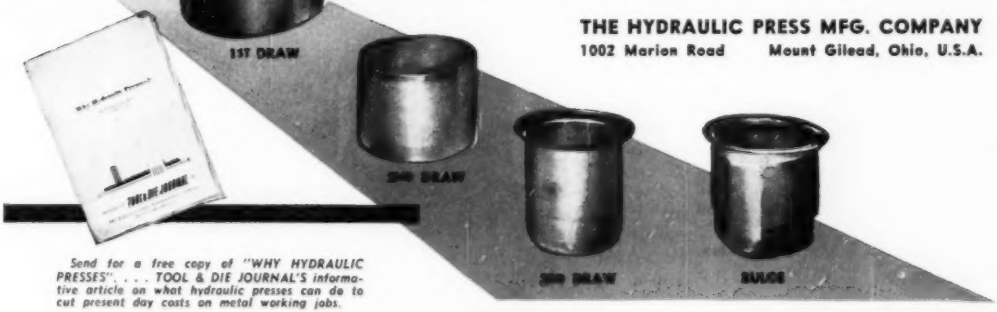
H-P-M HYDRO-DRAWING AND BULGING SOLVES A TOUGH *Production Job*

Look at the complex shape of this aluminum deep well cooker shell for Hotpoint electric ranges! Yes, it's a real "toughie," but H-P-M double-action hydraulics make quick work of it . . . a draw every 10 seconds . . . 165 bulges per hour!

Take a tip from Hotpoint . . . choose modern H-P-M hydraulics for your sheet metal forming jobs. You'll get deeper draws, fewer rejects, longer die life, quicker die set-up and a fast cycle. H-P-M hydro-bulging can't be beat for complicated necked shapes!

Call in a nearby H-P-M engineer. Find out what money-saving H-P-Ms will do for you. There's no obligation . . . *write today.*

THE HYDRAULIC PRESS MFG. COMPANY
1002 Marion Road Mount Gilead, Ohio, U.S.A.

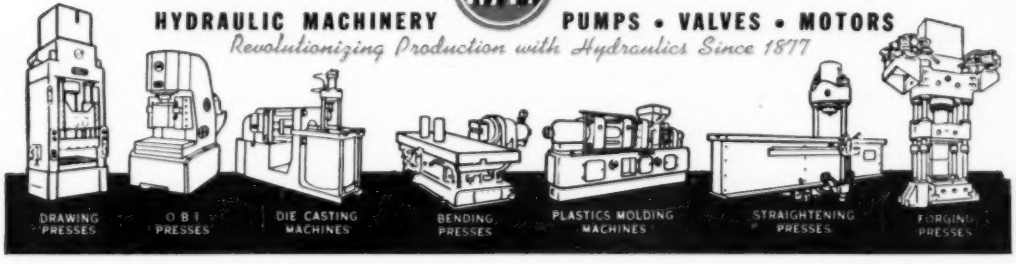


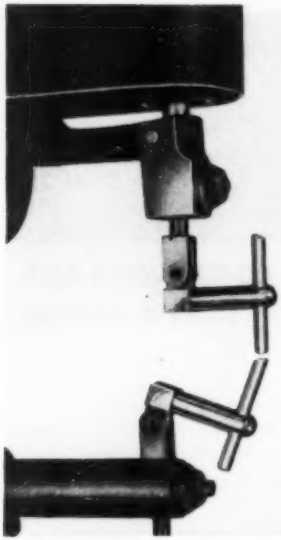
Send for a free copy of "WHY HYDRAULIC PRESSES". . . . TOOL & DIE JOURNAL'S informative article on what hydraulic presses can do to cut present day costs on metal working jobs.

HPM

HYDRAULIC MACHINERY PUMPS • VALVES • MOTORS

Revolutionizing Production with Hydraulics Since 1877





Bench-Type Welding Electrode Holder Has 180° Head Adjustment

Bench-type welding electrode holder offers adjustment using standard packaged electrodes. It has a full 180° range of head adjustment with positive locking in any position under full operating pressures. Heads are available for 30° or 90° electrode angle and the electrodes have positive non-slip adjustment in the holder head over their entire length of 1¾ in.

Because each electrode has a 90° and 30° welding face, in combination with 90° and 30° holder heads, a variety of positions is possible. Holders eliminate the need of handling rod stocks for making up special electrodes. Electrodes are available in Elkaloy A and Mallory 3 metal, and are packaged in 1/16, ⅛ and 3/16 in. diameters.

P. R. Mallory & Co., Inc. Indianapolis, Ind.

Kelite Formula 504 Removes Paint, Sludge, Light Carbon

Improved Kelite Formula 504 removes paint, sludge, and light carbon from automotive and aircraft engines and parts, and is for similar metal cleaning. It is claimed to be safe on all metals, including cadmium and zinc, and will take a great deal of contamination and still clean. It has a low evaporation rate and will not burn up to 140 F. It is used at normal room temperature. Formula 504 is packed in 55- and 15-gal. drums and 5-gal. cans.

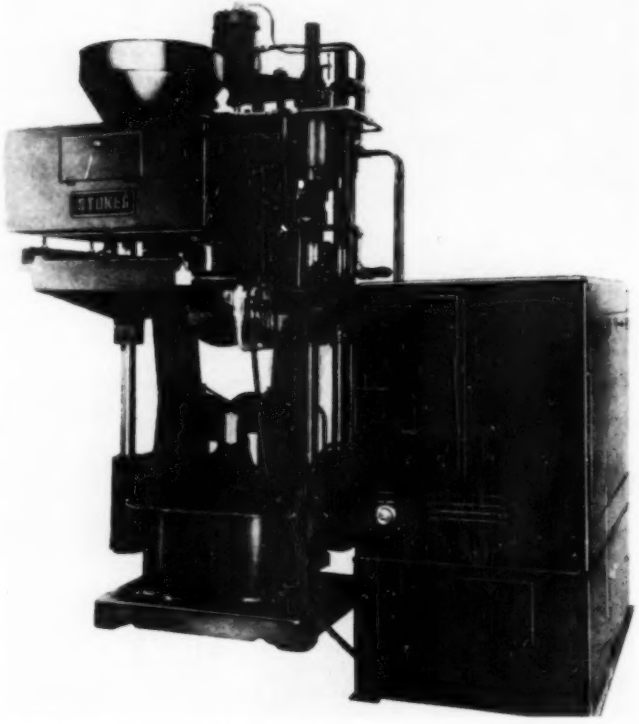
Kelite Products, Inc., Box 2917, Terminal Annex, Los Angeles 54, Calif.

Equipto Steel Drawer Cabinets Designed for Small Parts

Two strong low-priced steel drawer cabinets are offered for nuts, bolts, washers, screws and other small parts. They can be used singly side by side or stacked on top of each other. Frames are welded into one assembly. Drawers have adjustable cross dividers on 1-in. centers. Lengthwide dividers may be added or removed at will. Label holders are furnished on every drawer and divider. Cabinets are furnished in olive green baked enamel.

Equipto No. 11 has 18 drawers, each with 3 cross dividers, giving 72 adjustable compartments. The over-all size is 34x13¾x12 in. deep. Drawer size is 11⅞x5⅝x3¼ in. high. The No. 11 sells at $24.50. Equipto No. 8 has 8 drawers, each with 2 cross dividers, giving 24 adjustable compartments. Over-all size is 25½x10x12 in. deep. The drawer size is the same as No. 11. No. 8 sells for $11.50.

Equipto, Div. of Aurora Equipment Co., Aurora, Ill.



AUTOMATIC MOLDING PRESS is self-contained and provided with a special checking device to control the automatic action of press through ejected part. The 150-ton Model 257 press will produce at low cost plastic tube bases, fluorescent sockets, and other parts, where quantity production is essential. Either preform or powder feed can be used. Positive ejection is accomplished through separate ejection cylinder. Bar-type control governs all steps in cycle. Power unit operates at relatively low hydraulic pressures and minimizes leaks, replacement of gaskets, oil seat and maintenance expense—*F. J. Stokes Machine Co., 5900 Tabor Road, Philadephia 20, Pa.*

Lundberg Screw Products Co. makes *better* studs *at lower cost* with J&L ELECTREAT COLD-FINISHED STEEL BARS

J&L STEEL

Cutting precision threads on J&L Electreat Steel with a two-spindle threader at Lundberg Screw Products Co., Lansing, Mich.

Steel costs are reduced 20% to 30% . . .
Heat treating of finished studs is eliminated.

Steel studs made by Lundberg for such equipment as truck axles, farm implements and diesel locomotives, must be made to exact specifications.

By using J&L *Electreat* cold-finished bars to replace higher-cost alloys, such as chrome-molybdenum and chrome-nickel-molybdenum, Lundberg not only meets the customer's specifications but also obtains *two savings: Steel costs are reduced*, and *the nuisance and expense of heat treating is eliminated.*

In addition—finished studs are of better quality. They are free from scale and distortion caused by "batch" heat treating. They have clean, sharp threads. Inspection rejects are reduced.

Each bar of J&L *Electreat* cold-finished steel is individually heat treated at the mill by the electric-induction process under exacting control. The flexibility of heat control in the Electreat process permits "tailor-made" combinations of surface and core properties to fit *your* requirements.

Many fabricators of gears, couplings, bolts, nuts, shafts and other steel parts take advantage of these money-saving qualities of J&L *Electreat*. The booklet, "*New* J&L *Electreat* Heat-Treated, Cold-Finished Steel," compares the properties obtained by the Electreat process with conventional "batch" heat-treatment and points the way to greater profits. Let us send you a copy.

Jones & Laughlin Steel Corporation
402 Jones & Laughlin Building
Pittsburgh 19, Pennsylvania

Please send me a copy of "*New* J&L *Electreat* Heat-Treated, Cold-Finished Steel."

Do you recommend Electreat for:

NAME _____

COMPANY NAME _____

ADDRESS _____

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOLOY *and* JALLOY *(hi-tensile steels).*

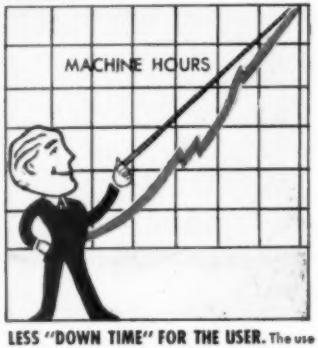
PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

LAMINUM* SHIMS GIVE THE FULL SAVINGS OF SHIM DESIGN!

PRECISION ADJUSTMENTS by simply peeling laminations. No grinding, miking, filing. Machining tolerances are greatly increased because the shim provides for exact fit and takeup.

AT-THE-JOB ADJUSTMENTS. No need for standby lathe or operator. The only tool required is a jackknife to peel off a .002" or .003" lamination.

PREVENTION OF OIL AND PRESSURE LOSS. Fitted with babbitted lugs, LAMINUM shims will also seal oil in the bearings of high speed pressure-lubricated equipment.



LESS "DOWN TIME" FOR THE USER. The use of LAMINUM provides a permanent adjustment feature to allow for wear and preserve critical accuracy.

Send today **for chart illustrating 46 money-saving, time-saving applications, detailed specifications, sample of LAMINUM.**

PRECISION STAMPINGS in any quantity

Let us quote on your *difficult* stamping jobs. Our experience, tools and presses are geared for *close tolerance* production.

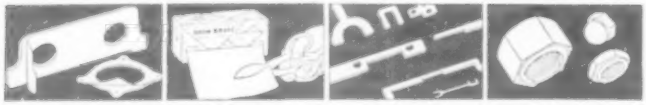
* LAMINUM (Reg. U. S. Pat. Off.) shims are solidly bonded laminations of .002 or .003 inch precision gauge brass or steel with a microscopic layer of metallic binder. Cut to your exact specifications.

LAMINUM

THE SOLID SHIM THAT peels FOR ADJUSTMENT

LAMINATED SHIM COMPANY, Inc.

3106 Union Street Glenbrook, Conn.



SHIMS SHIM STOCK STAMPINGS AN-COR-LOX NUTS

ROUND TABLE *Discussion*

TOO GOOD

What kind of a company do the boys work for that is not modern enough to have some type of wage incentive policy? Could it be that they never heard of such a thing as paying a man for extra output over and above the normal output of a normal man?

Problems often arise in shops where fellows such as the one mentioned in the article have the desire to work beyond the normal pace. It is a great problem for the foreman if a good wage incentive plan is not in use. The employee's wages can not usually be raised for this would tend to upset all wage scales. So the worker either soon slows down or leaves and goes to some other company using a wage incentive plan.

Wage incentives are made up of many varied ideas of calculations. They are all similar in that they pay for the extra effort put out by an employee over a normal set by time-study, motion study or some other correct means of determining a normal output, under normal conditions and at a normal rate.

Things such as interference, materials handling, personal and fatigue time and any other allowances that repeat themselves on the job are allowed in setting up the rate. Once this rate is established, usually it can not be changed for a period of one year . . . unless some method is changed which will affect the rate.

Thus the old cry of the worker, "the company is trying a speed-up system," is eliminated.

Again today many companies operating under wage incentive plans have union time-study men who check all rates before they are accepted. This leads to a closer tie between labor and operating management.

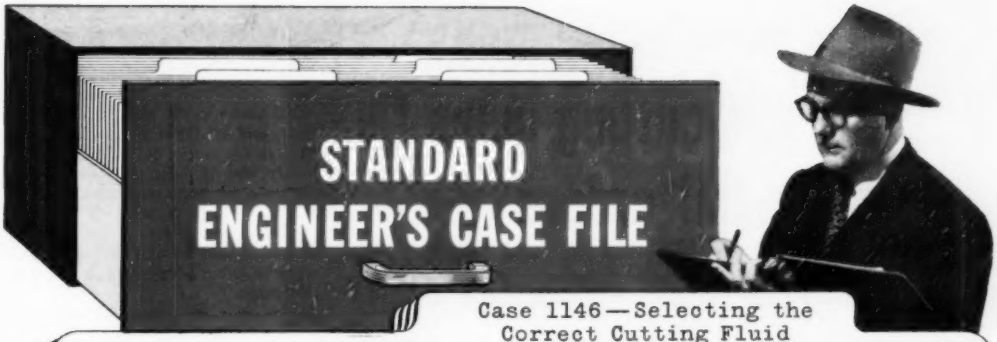
One thing to remember in a wage incentive plan is always set your rates on the normal operation. Don't set them on the man running the job. He is human and can vary. The work produced by a normal operator working under normal conditions at a normal rate will always be the same for the same work.

Charles D. Townsend
Centralia, Mo.

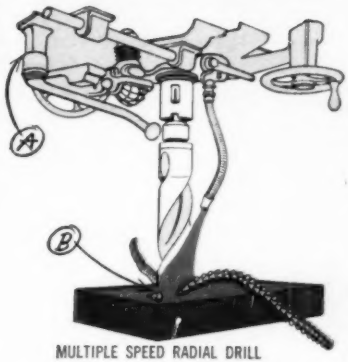
•

REST FOR THE WEARY

When the question of allowing men to sit down when a cut was on was mentioned to granddad, he was most



Case 1146—Selecting the Correct Cutting Fluid



MULTIPLE SPEED RADIAL DRILL

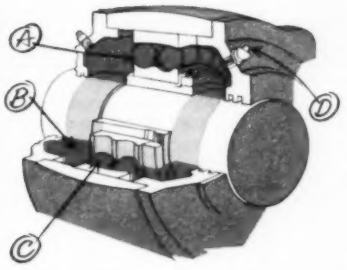
In tests on machine tools of all different types, the Calol Cutting Fluid recommended for each operation produced fine surface finish on work. This is because recommendations for Calol Cutting Fluids are made from actual working results — tests made on a special drillpress, the Drilling Torque Tester — and the results recorded by electronics. Calol Cutting Fluids come in four general classes: mineral oils, ready-mixed compounded oils, concentrates and soluble oils.

A. Made for every machining operation — from toughest broaching to simple grinding.

B. Lubricating, cooling and flushing qualities assure longer tool life and better work finish.

Calol Cutting Fluids also give maximum rust protection to machine tools and work. The soluble oils in the line mix with water easily and form strong, stable emulsions.

Case 1147—Lubricating Bearings Carrying Extreme Loads



HEAVY-DUTY INDUSTRIAL BALL BEARING

In tests by a bearing company, Calol E.P. Roller Grease carried bearing loads in excess of 20,000 pounds per square inch, more than twice the load-carrying capacity of ordinary greases. For anti-friction or plain bearings. Comes in three grades and two types: Nos. 0, 1X and 2X. The "X" type has additional compounding to impart extra stringiness, and extra adhesiveness to withstand washing action of water.

A. Extreme-pressure additives assure lubrication under extreme shock load conditions.

B. Resists extreme temperatures — has lubricated satisfactorily in bearing temperatures of more than 200° F.

C. Non-corrosive to any bearing metal . . . will not harm rubber, neoprene or plastic bearing seals.

D. Pumps easily in low temperatures . . . may be used in all grease pressure systems.

For additional information and the name of your nearest Distributor, write

STANDARD OIL COMPANY OF CALIFORNIA

225 Bush Street, San Francisco 20, California

The California Oil Company
Barber, N. J., Chicago, New Orleans

The California Company
17th and Stout Streets, Denver 1, Colo.

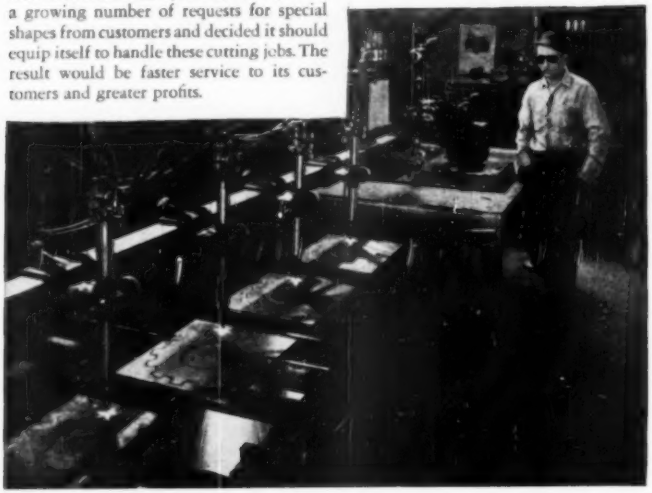
Standard Oil Company of Texas
El Paso, Texas

CALOL

Trademark Reg. U.S. Pat. Office

Steel warehouse finds machine gas cutting helps fill special orders ...faster—at less cost

BRACE-MUELLER-HUNTLEY, INC., steel distributors in Syracuse, N. Y., noted a growing number of requests for special shapes from customers and decided it should equip itself to handle these cutting jobs. The result would be faster service to its customers and greater profits.



William Burkhardt, Airco Representative, was called in and he recommended machine gas cutting with an Airco No. 6B Oxygraph equipped with a four torch setup and an electronic tracing device.

The apparatus was quickly installed and put into operation. One-day service was offered to customers requiring intricate as well as ordinary shapes.

Company executives stated that the Oxygraph with the electronic tracing device enabled them to make additional profits and also to handle a wide variety of cutting jobs quickly and easily.

• • • •

TECHNICAL SALES SERVICE — ANOTHER AIRCO PLUS-VALUE FOR CUSTOMERS

To assure its customers of high efficiency in all applications of the oxyacetylene flame or electric arc, Air Reduction makes available the broad, practical experience of its nationwide Technical Sales Division personnel. The collective experience and knowledge of these specialists has helped thousands to a more effective use of Airco processes and products. Ask about this Airco "Plus-Value" service today. Write your nearest Airco office. In Texas: Magnolia Airco Gas Products Company . . . On West Coast: Air Reduction Pacific Company.

AIRCO **AIR REDUCTION**

Offices in All Principal Cities

Headquarters for Oxygen, Acetylene and Other Gases . . . Carbide . . . Gas Welding and Cutting Machines, Apparatus and Supplies . . . Arc Welders, Electrodes and Accessories

contemptuous. Sit down in working hours; whoever heard of such a thing? In my young days men came to work, to work, ay and to work hard, too. To grunt and to get a wet shirt; that was the way to please the boss, and it didn't matter as much how much work, or how little, one really did if your shirt was wet. Anyway what are they paid for? Not to sit down surely. Provide 'em with stools? They'll be expecting cots, hot-water bottles and grub next and a nurse to rock 'em to sleep. Pshaw! Nonsense.

Yes, this was granddad's experience, but has it not long been realized that grunts and wet shirts are not, of themselves, indications of production or even of intelligence. Production from machines in the greatest volume is associated with the use of brains and skill and the avoidance of fatigue whenever practicable. To make a man tired by refusing to allow him to relax when relaxation is possible without loss of output or quality is just silly and does harm rather than good. It is just an abuse of authority and of deficiency of gray matter in the upper story.

The writer was in a new berth, his duties being to obtain efficiency in production. One day in a round of the shop, he saw a planer rise from the box on which he had been sitting. His machine was running, cut in depth and feed good, stroke, the shortest consistent with safety. He was asked why he rose. He replied that the foreman did not like to see men sittting and he thought I may object. He was told that he should sit whenever to sit did not retard production, and the foreman was brought to see the wisdom of this. Common sense is always better than pettifogging rules; production and its obtainment should be the predominant consideration and the avoidance of fatigue is a dominant factor.

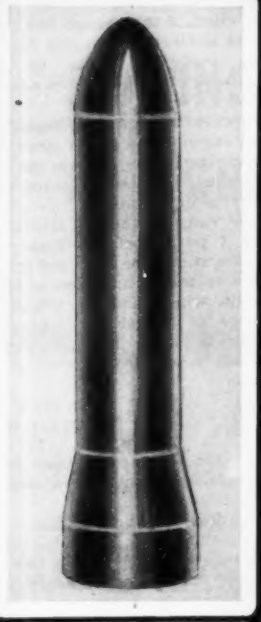
P. E. James
Lincoln, England

•

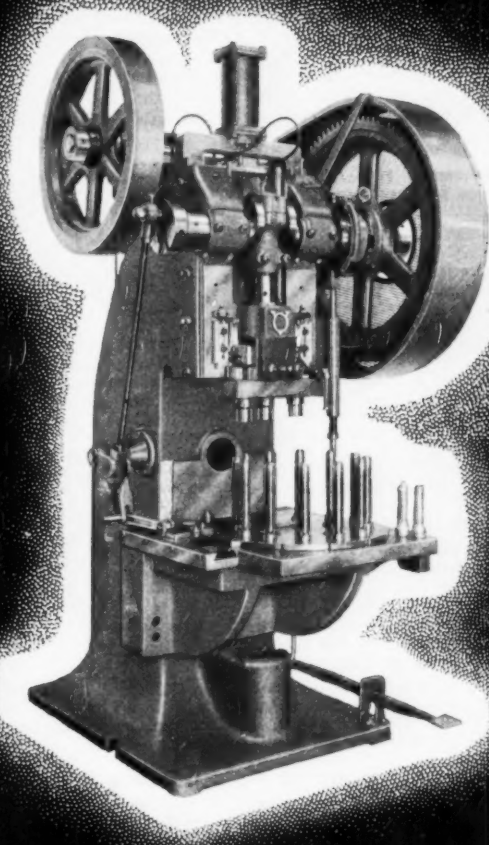
THE LOST THOUSANDTH

The drafting department should in no case allow their records to go out of their possession and therefore in this case they must stand a major share of the responsibility for not having made at the least a sketch showing the important dimensions for the use of the shop while the established record remained in the drafting or engineering department.

In most cases figures that have been changed can be detected by



designed to cut stamping costs and produced by.. V&O



PRODUCTION
3000 pieces per hour

The long overhanging bearings of V&O Presses provide a rigidity which adds materially to the life of the dies. These presses lend themselves to the use of special fixtures which contribute to their greater productivity and ease of operation.

With our 60 years experience in the design, development and application of power presses on which to draw, our engineers can be of valuable assistance to you on your stamping problems.

the V&O PRESS CO.

DIVISION OF ROCKWELL MANUFACTURING CO.

... Hudson, New York

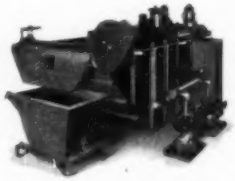
Yes, COOLANT CLARIFICATION CAN CUT YOUR COSTS!

ASK THE HUNDREDS OF INDUSTRIES USING HOFFMAN SPECIALIZED FILTRATION UNITS

Everything to gain (nothing to lose) when you check the whole host of production savings you can make with today's advanced filtration techniques. Let Hoffman engineers show you how you lower unit costs by eliminating individual sump cleaning – by making grinding wheels and cutting tools last longer – by improved quality control. Hoffman builds a complete line of filtration products, each one designed to pay for itself quickly. Get the facts.

FLOTATION EQUIPMENT FOR AUTOMATIC CLARIFICATION OF SOLUBLE OIL COOLANTS

A Hoffman exclusive process that is entirely mechanical . . . aerates particles out of dirty coolant . . . requires no added material. Sludge discharged into receptacle automatically. Models from 20 to 1,000 g.p.m. Larger sizes to your specifications.



COMPLETE RECOVERY OF USED OIL IN THE HOFFMAN OIL CONDITIONER for hydraulic, lubricating and run-in oils. Combination cartridge filter and vaporizer removes both insolubles and solubles (air, gas, moisture and fuel dilution). May be operated separately or together. No steam or water connections. Portable, if desired. Capacities of 50 to 600 g.p.h.

CARTRIDGE FILTERS FOR 7x18 OR 11x18 CARTRIDGES

Wide range of sizes, for either 7x18 Navy throwaway or 11x18 repackable or throwaway cartridges. Exclusive headlifting device speeds cartridge change. With or without heaters and controls to fit your requirements.

DISC FILTERS FOR CONTINUOUS FLOW IN SMALL SPACE

Three sizes of this compactly designed filter will remove dirt particles from 3 to 5 micro inches. Models from 1 to 10, 5 to 50, and 50 to 125 g.p.m. No moving parts . . . minimum maintenance . . . low first cost.

PRESSURE FILTERS FOR FINE FILTRATION

Designed for use with approved filter-aid powders, the Hoffman line of pressure filters offer finest clarity filtering of straight oil coolants – especially those of heavier viscosity.

OTHER SPECIALIZED HOFFMAN products for coolant clarification include Vacuum Filters in a variety of sizes (many of them self-cleaning) and Vacuum Stills.

WRITE NOW for Bulletins and a FREE Survey

FILTRATION DIVISION — U.S. HOFFMAN MACHINERY CORPORATION

211 LAMSON STREET, SYRACUSE 6, N. Y.

CANADIAN PLANT: CANADIAN HOFFMAN MACHINERY CO., LTD., NEWMARKET, ONT.

careful examination, however in the case cited, if the change was made it was so cleverly executed that nobody seemingly could be sure whether a change had been made or not.

However the drawing should have been examined by one or more competent men who were in no way connected with the men involved or with the organization.

The value of the job involved is only a portion of the matter for consideration. The other and greater value to the organization is to ascertain where and by whom the change or mistake, whichever it proved to be was made, thus clearing any who were innocent in the matter.

John Mark May
Watervliet, N. Y.

•

There have been many cases where the veracity of one of two men has been at stake.

The loss of one thousandth of an inch may be quite a serious matter in some cases; especially is this true in the manufacture of interchangeable parts.

Among the plants where the tolerances are required to be close are automobile, ordnance (guns, etc.), sewing machines, typewriters, cream separators and others.

0.001 in. on a taper may mean the reprocessing of the piece, and it or its complement may be discarded entirely, for a taper on a machine or other part should match the taper on or in another detail.

If this is not so, a line contact instead of a surface contact may be the result. This is bad, very bad.

By the above we mean that, as an example, the small ends of an inside taper and an outside taper may be O.K., but the large end of the outside or receiving taper may be 0.001 in. large, hence, there will be a line contact at the small end while the large end will be loose.

Back in the old days (not good old days) the usual close fit was considered, as we said, one half of one sixty-fourth or 1/128 in. for all occasions.

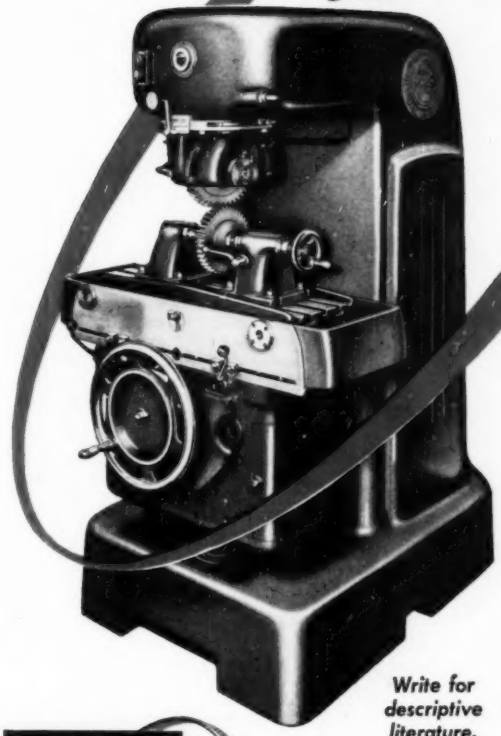
Well is it remembered that, during my apprenticeship, my foreman came around with a "mike" and told me that we were going to work with them.

He handed me the mike and the folder which came with it and told me to learn how to use it and said, "Look here, Boy, we are goin' to work to this thing."

By the time he had talked to another man and had arrived at his improvised desk (made from a cou-

SHAVING ASSURES BETTER GEARS AT A GREATER OVER-ALL

Production Economy



This gear shaving machine, the first of its kind, was introduced 16 years ago to fulfill the urgent need of gear manufacturers for a means of correcting precision gears and gears produced to operate under critical loads and speeds—these corrections to bring them within required tolerances.

Today, it is being used by all the leading manufacturers in the automotive industry, the majority of gear jobbing shops and nearly all the machine tool builders.

One gear manufacturer says shaving has reduced rejects which formerly amounted to about 50% to none. Another says that shaved gears have cut operating power requirements approximately 20%.

Gear shaving eliminates the need for skilled machinists, regardless of the degree of precision required. Accuracy does not depend on the shaving machine operator. Shaving also makes it easier to turn out acceptable gears. The teeth of shaved gears have uniform accuracy and the characteristics of all the gears in any lot will be uniform.

Write for descriptive literature.

SPUR AND HELICAL GEAR SPECIALISTS
ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORM

NATIONAL BROACH AND MACHINE CO.
3600 ST. JEAN . . . . . DETROIT 13, MICHIGAN

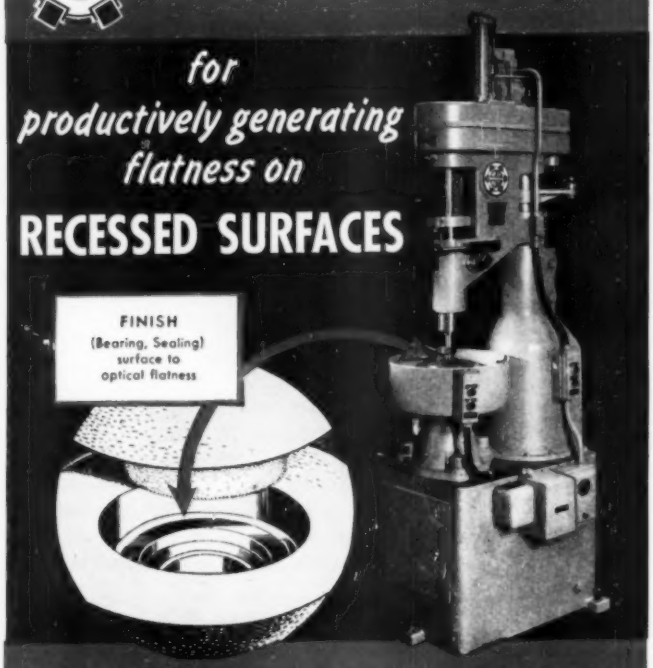
WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

MICRO MATIC

MICROFLAT

for productively generating flatness on

RECESSED SURFACES



● Microflat machines may be equipped to finish recessed surfaces.

The location of a surface does not limit the application of the MICROFLAT machines. Any surface that can be machined can be finished with this equipment. The surface finish and flatness generated can be controlled and held to any specified requirement.

The machine shown above is equipped with a timer and an air cylinder. The operator loads the part into the fixture and starts the cycle. The fixture rotates, the bonded abrasive finishing surface oscillates and rotates. At the end of a predetermined time cycle the spindle automatically withdraws. Production is 300 pieces per hour.

MICROMATIC HONE CORPORATION

8100 SCHOOLCRAFT AVENUE, DETROIT 4, MICHIGAN

DISTRICT FIELD OFFICES:

ple of old crates) I handed him the mike and the folder and said, "I know how to work this mike."

Thereupon he demanded that the mike be set for a dimension which was done; then he demanded another and a third.

After this he said, "Boy you've got it."

The mike was passed from one man to man and we, immediately began working to close measurements as were considered at that time.

There were many discussions, pro and con, about "newfangled ideas" by our men.

Now about Smithers, who is about to quit.

Ed believes him and probably others who work with him do likewise.

Many a controversy of this type has arisen between the shop and the engineering department and neither side has given in.

If, in the small or medium-sized shop, a man on one side or the other is fired, the man in the shop is very frequently the man who loses out.

There are reasons for this: First, the engineering department is considered to be the brains of the institution as far as design is concerned and to be nearer to the executive department. This means that it is in contact with the management many times, so the two are closely associated; again, the chief engineer is considered a high up man. He is usually selected and hired by an executive of the firm and if the chief engineer does not back up his department and the men in it, he gives a black eye to the executive who engaged him.

Take it on the other hand, if Ed has been several years with the firm; has always been found to be on the square, and this seems to be the case, his word will go a long way in the defense of Smithers.

Now, the above has considered the small and medium shops and plants.

In a large plant, such a matter is, many times, decided by the personnel department.

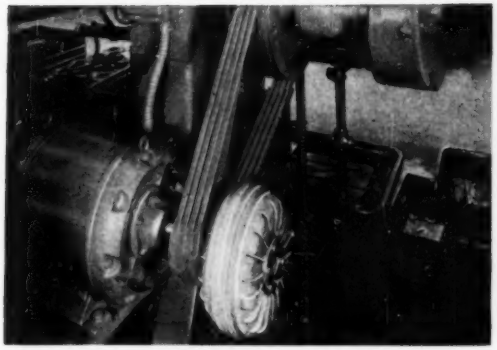
This usually results in a full consideration of the case without any action being taken until due and conscientious contemplation is allowed upon the subject, then all sides are brought in and a verdict rendered.

F. H. Stebbins
Worcester, N.Y.

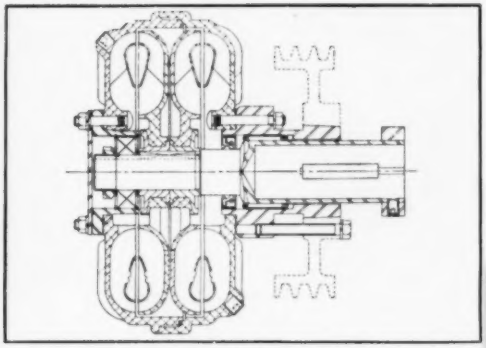
●

In the problem the lost thousandth I cannot help but feel the chief engineer is partly to blame. He should know that the specifications on a

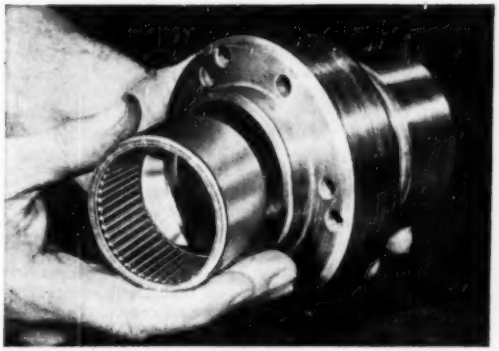
Torrington Needle Bearings Save Space and Give Dependable Service in Twin Disc Hydro-Sheave



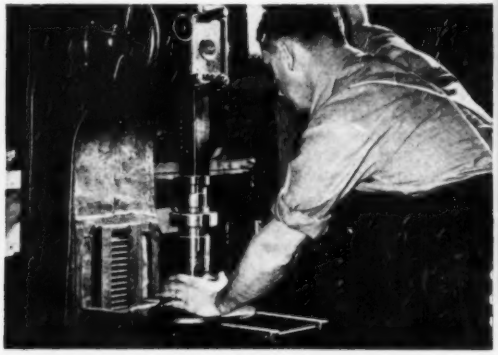
The Twin Disc Hydro-Sheave Drive, made by Twin Disc Clutch Company, permits smooth acceleration and prevents stalling of electric motors and internal combustion engines. Efficient power transmission is secured with compact Torrington Needle Bearings.



Cross-section shows location of the Needle Bearing under the sheave. The compactness of this bearing, with its small diameter rollers and thin outer race, makes it ideal for this application. Its oil reserve capacity eliminates need for pressure lubrication.

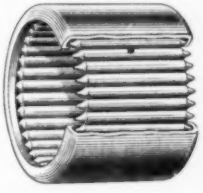


The full complement of precision rollers, operating on a hardened and ground shaft, provides tremendous load capacity. This feature, combined with the low coefficient of friction, assures reliable operation and long, trouble-free service life.



Needle Bearings are easily installed with a simple arbor press operation. The bearing takes a firm press fit, and therefore requires no retaining devices. Thus, to the advantages of compactness and efficient operation are added speed and economy of assembly.

Many machines can be made lighter, sturdier, more compact and more efficient with Torrington Needle Bearings. Our engineers will be glad to help you adapt these high capacity bearings to your equipment. Write us today. THE TORRINGTON COMPANY, Torrington, Conn., or South Bend 21, Ind. District offices and distributors in principal cities of United States and Canada.



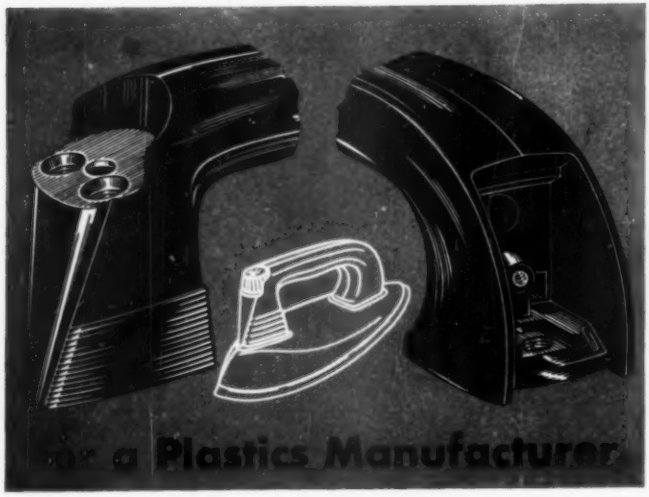
TORRINGTON *NEEDLE* **BEARINGS**

Needle • Spherical Roller • Tapered Roller

Straight Roller • Ball • Needle Rollers

Here's Where

HY-PRO taps paid 78 to 1



PART: Molded Plastic Flat Iron Handle

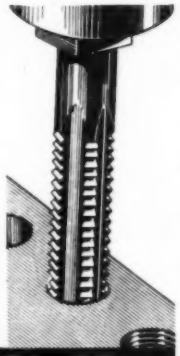
PROBLEMS: Taps being used to thread blind holes in molded plastic flat iron handles had a maximum life of 500 threaded holes in addition to spoiling many pieces by reaming out holes.

Then They Called in the HY-PRO Sales Engineer

HY-PRO SOLUTION: Hy-Pro's Engineer came up with a tap of special design having their exclusive HARDERNELL surface treatment. Results obtained in this highly abrasive plastic are fantastic—39,000 threaded holes per tap.

Above is a typical example of how the Hy-Pro Sales Engineer can help increase threaded-hole production. His expert engineering counsel backed by the most up-to-date tap production methods combine to solve tapping problems rapidly and profitably.

All Hy-Pro Taps are ground from tough uniform quality high-speed steel and given one of the Hy-Pro exclusive surface treatments.



Each tap is completely inspected by the latest electronic quality control equipment, your assurance that there will be no dimensional variance in Hy-Pro Taps of a stated size.

These precision manufacturing methods plus the ability of the Hy-Pro Sales Engineer to prescribe the correct tap for your particular job means *sustained accuracy* on your production line resulting in higher productivity from your tapping machines.

℞ Let Hy-Pro solve your tapping problem—call a Hy-Pro Sales Engineer today.

Order from your distributor.

HY-PRO TAPS

HY-PRO TOOL CO.

NEW BEDFORD, MASSACHUSETTS

A SUBSIDIARY OF CONTINENTAL SCREW COMPANY

drawing on ordinary paper is not protected against grease and oil even with a shellac coating. In any instance where a rush order is issued on plain paper it should be in a cellophane dispatch casing. The draftsman who accused a workman of tampering with the specifications is hopelessly uneducated no matter how learned he may be in other things.

We cannot blame Smithers for feeling the way he does as Al himself could not tell by looking that drawing had been tampered with. Certainly we must have consideration for Smithers' feelings in this case as there is no definite proof of the specifications being tampered with. We must also be thoughtful of Smithers' good record of honesty and ability. I do think that this mistake and this misunderstanding should be discussed by management and the mistake pointed out indirectly.

All charges should be withdrawn against Smithers and general viewpoint discussed to prevent a recurrence of this incident.

A. E. Salmons
Philadelphia, Pa.

•

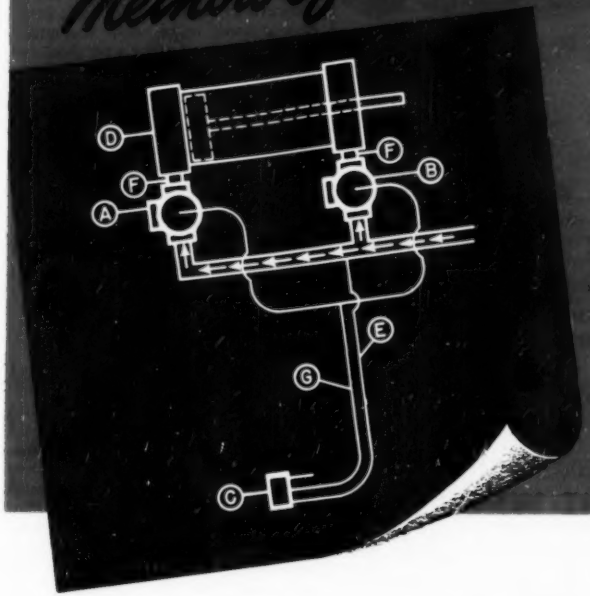
How strange the power of mental telepathy! It was only recently that I was thinking about an experience I had many years ago and here comes Al and Ed on the scene with a similar situation.

As a draftsman I was called upon to rush out a pencil drawing for something that was wanted in a hurry. In order to protect the drawing from grease and dirt it was painted with a light covering of shellac. The drawing was passed on to the checker and it was eventually sent to the shop foreman. The part was made and the drawing returned to the drafting room where, fortunately, it was placed in the file—so often temporary drawings are destroyed.

The next day there was hellapoppin! One of the diameters was a thousandth undersize. With our hearts in our mouths, the checker and I made a dash for the file and found, upon close examination, that something was rotten in Moscow. It was very evident that there had been some tampering with one of the figures—the figure 3 had been changed to a 2. Our chief, who had all the faith in the work of his checker, went to bat with the shop foreman.

The foreman, seeing the condition of the shellac covering, reached in his drawer and pulled out a magnifying glass. Having no reason to suspect his man, who had worked

How to Boost Production with new Method of Mounting Ross Valves



★ Faster Machine Speeds

★ Less Air Consumption

★ Economical Installation

★ Easier Operation

Close-coupling of valve to cylinder! That's the story behind the remarkable success of the *new Ross In-Line Master Valve.*

Users claim several important advantages. By placing the master valves (A & B) at the cylinder (D), air supply and exhaust are speeded up appreciably. This in turn permits faster movement of the cylinder piston and materially increases production.

At the same time, the close coupling means that two lengths of large diameter piping between valve and cylinder—pipes continually filled and exhausted with non-productive air—are replaced by two short connecting pipes (F). The resultant saving in air with every movement of the piston considerably reduces operating costs.

Operation is by a small, conveniently located 3-way pilot valve (C). It is supplied through tubing (E) and connected to the master valves by tubing (G). It may be mechanically, manually or electrically controlled. Hand or foot operation is greatly facilitated by the use of the smaller, more easily actuated pilot model.

The complete story of possible advantages in *your* production will be gladly furnished without obligation. Ask for Bulletin No. 302.

Ask Ross for Any Air Control Information

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ROSS OPERATING VALVE COMPANY

ROSS Air Control VALVES

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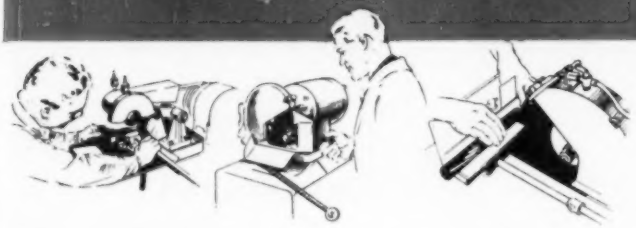
Are you cutting unannealed steel . . . hard copper tubing . . . glass bottles . . . tungsten wire . . . rubber hose . . . no matter *what* you're cutting, here's how to cut it efficiently, economically.



THE METHOD *Abrasive Cutting!* The high-speed, high-precision method that offers important cost-saving possibilities. Even when you work with the most difficult materials, the abrasive wheel slices or slits to size within a few thousandths, in a matter of seconds . . . leaves a finished surface . . . minimizes material waste.

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Allison (*Rubber Bonded or Resinoid Bonded*) Cutting Wheels. In developing our wide range of wheels to solve successfully even the "impossible" problems so often encountered in abrasive cutting, the facts and figures we have compiled will go a long way toward helping us make specific wheel recommendations to meet the needs of your job . . . and will mean savings.

We suggest you send us samples of the work you're cutting so that we may recommend the *right wheel.* Or we will gladly arrange for an Allison Field Engineer to call.

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TUNGSTEN

IF SO CALL AN *Allison*

ABRASIVE CUTTING EXPERT

Allison ABRASIVE CUTTING WHEELS

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Here are the complete facts on Abrasive Cutting and Allison Wheels . . . yours for the asking. Send for your copies today.

THE ALLISON COMPANY
256 Island Brook Ave., Bridgeport, Conn.

for him for several years, the foreman did the usual thing—scratched his weary head in utter bewilderment. The three musketters lost no time in seeking out the worker and after being asked what he thought of it he vehemently denied having changed the drawing. Then the three officials scratched their heads in unison as the worker folded his arms and stood defiant. The three returned to the foreman's desk, powwowed some more about the situation, then the checker and chief returned to the drafting room—leaving the poor foreman nonplussed, while the worker who may have been guilty, or innocent, recited the six or seven verses of Bryant's famous poem in words sizzling with appropriate words of indignation.

While no accusations were made, the inference was there and the man's feelings were hurt from all outside observations. Can we afford to conduct manufacturing procedure in such a manner that misunderstandings, such as this, are likely to arise?

The drawing had been changed after it had left the drafting room. What proof could anyone have that it was the workman who did it? It could have been done by any of the men in the shop—perchance an enemy of the man—or it could have been done by the foreman, stenographer, or the night watchman. How the figure was changed or who did the changing is not the important thing at the moment. The main question is "how to prevent such misunderstandings between the two departments?"

No drawing should go to the shop unless it is a duplicate print of the original which should, by no means, leave the confines of the engineering office. If a temporary sketch is necessary to save time it must be accompanied by the possibilities of danger and misunderstandings. A few extra minutes of proper procedure will save hours of grief.

John Homewood
Ontario, Calif.

•

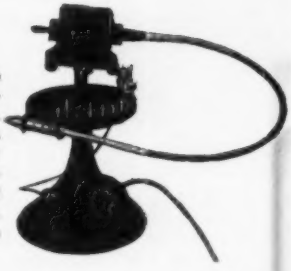
The foreman should always stand by his men whenever he feels they are right. A shellac-covered pencil drawing, no matter how dirty it gets, should not be changed by the working man or the engineer. If there was a question of deciphering an illegible dimension, the machinist should have asked the foreman for his interpretation. The foreman should have returned it to the engineering department if he found the figure was ambiguous.

The foreman should carefully ex-

HERE'S HELP FROM haskins

IMPROVE PRODUCT QUALITY, CUT PRODUCTION COSTS!

Yes, here's real help from the leading manufacturer of flexible shaft equipment . . . HASKINS! It's *help* in the form of versatile tools that assure high quality work, stand up under hard, continuous service, and free labor for more productive work. Haskins Flexible Shaft Machines speedily and efficiently perform grinding, sanding, filing, wire brushing, buffing and polishing for die, mold, and patternmaking, stainless steel and general fabricating. And remember, with flexible shaft tools, the operator handles only the lightweight handpiece—the heavy motor is conveniently located 6 feet away. Operator works faster, with less fatigue. Haskins makes a *complete line*—from lightweight, direct-drive machines, to heavy-duty, multi-speed units . . . all designed to help you speed production and lower costs.



HASKINS VB-2 high speed grinder develops up to 18,000 r.p.m. free speed . . . makes cutting wheels and tools last longer. Recommended for general light production work. Suspended or bench mounted.

HASKINS HS-4 is a pedestal mounted, portable machine recommended for general die shop work . . . has a ½ h.p. air jacket motor, and six-speed, Timken-bearing countershaft that develops up to 7800 r.p.m.

HASKINS RA-5 is recommended for lacquer polishing, rubbing and sanding operations where a portable unit is desired. Heavy-duty ½ h.p. motor, direct drive with speeds to 3425 r.p.m.—pedestal mounted.

HASKINS SPH-6 for stainless steel grinding, sanding, buffing, etc. Has a 1 h.p. motor; four-speed Timken bearing countershaft; speeds to 3400 r.p.m. Mounted on pedestal at bench height.

HASKINS HS-7 is mounted on a three-wheel, heavy-duty truck. Full 1 h.p. motor, four-speed countershaft develops up to 3100 r.p.m. Here's portable equipment recommended for heavy grinding, sanding, wire brushing and polishing operations.

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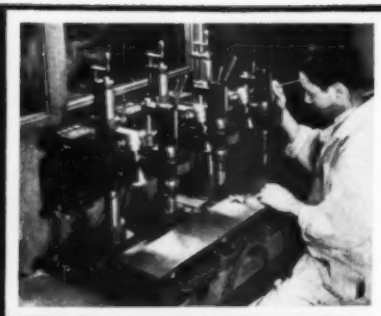
☐ HASKINS SPH-6 ☐ HASKINS HS-7

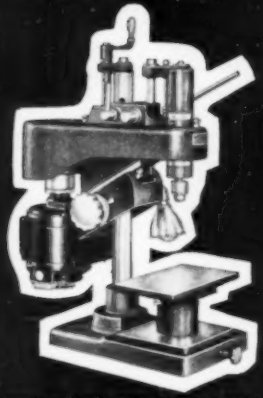
Name .....
Firm Name .....
Address .....
City ..... Zone ..... State .....



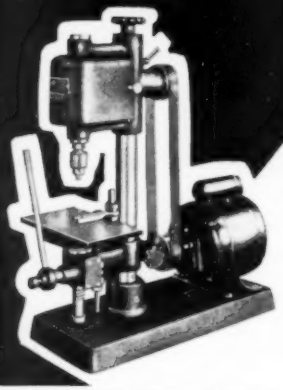
Note in the photo above how the tables butt to form a continuous work surface when machines are installed in batteries.

AT THIS POINT
YOU CAN SOLVE YOUR SMALL HOLE PROBLEM

If your job includes the drilling and tapping of small holes, with surgical precision and on tight production schedules, the two Hamilton precision tools shown here were built to meet your special need. They excel in fast, precision drilling and tapping of small holes in materials as diverse as paper and monel or ceramic and bronze. *And more* their flexibility, sensitivity, and stamina far exceeds the requirements of the average user.



Hamilton Varimatic, Super-Sensitive Drilling Machine. Infinitely variable speeds from 840 to 9300 R. P. M. Drills holes from .004" to 5/16".



Hamilton Super-Sensitive Tapping Machine. Patented power transmission. Tap idles in reverse and automatically changes direction of rotation when pressure is applied to feed lever. Released pressure again reverses spindle, reduces speed to "idle" and withdraws tap. Capacity from the smallest and finest tap to 10–32 inclusive.

For complete specifications and prices write today for our Varimatic Bulletin V-47 and our Tapper Bulletin T-47.

THE Hamilton TOOL COMPANY

SUPER SENSITIVE DRILLING MACHINES · TAPPING MACHINES · POSITIONERS

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amine every drawing before issuing it to his men to determine if every figure is legible. He should note the critical dimensions and tolerances on small sketches and point these out to the man assigned to the task. In this manner he is acquainted with each figure and when a question is raised, will recall his interpretation. If the machinist followed a line of thought different from the foreman's then the foreman should take the blame for not instructing his man properly. On the other hand, if the machinist followed the foreman's reasoning, the foreman should back up the man and instruct the engineering department to issue explicit drawings or specifications.

I worked with a concern a few years ago whose drafting staff was highly theoretical and obstinate. Their knowledge of machine-shop practice was inadequate but they refused to accept any advice or criticism regarding their drawings or specifications. Their cryword was "follow the print!"

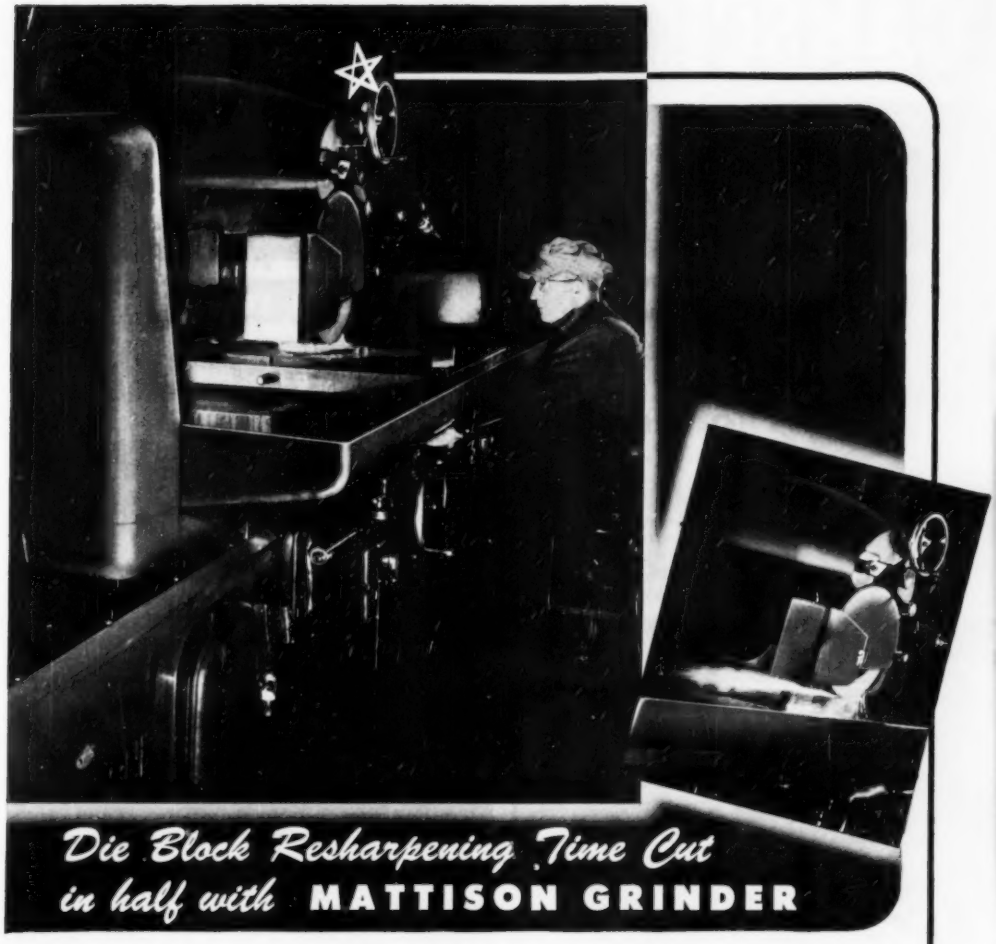
For instance, they might specify a 1-in. pin. 0.005 in. oversize, for a force fit in a 1-in. reamed hole. When we pointed out that this was practically impossible, they would belittle our ability. They also pointed out that the machines in operation were made from these same prints and that all replacement parts or developments must follow the prints.

The foreman long ago gave up his fight with these men and made all the machines according to shop practice. Since the machines operated successfully, the engineering department assumed that their prints were correct. For a while peace reigned between the two departments, but the engineering department subcontracted some of the parts being made for licenses. When these parts arrived on the job, they were like the prints and would not fit the machines.

The top brass ordered a thorough investigation, and being influenced by the chief engineer, discharged most of the machine shop. After they cooled off, they immediately recalled the men with an increase in pay, realizing that they were more important than the file of inaccurate blueprints.

The draftsmen were then instructed to bring their prints up-to-date and every new print had to be approved by the machine-shop foreman. Eventually one of the machinists, who was studying engineering at night, became assistant engineer and relieved the foreman of this responsibility.

Frank J. Zarnowsky
Rutherford, N. J.



Die Block Resharpening Time Cut in half with MATTISON GRINDER

● Grinding time for resharpening large dies has been cut in half by Allis-Chalmers Manufacturing Company through the use of their Mattison Grinder. This is true in the case of the 45″ diameter Neor hardened steel laminated blanking die shown above and also of the die shown to the right above.

The Mattison Grinder is particularly adapted for reconditioning dies of all types. Its high power and ability to hog off stock permit sharpening dies in a short time, thus eliminating costly delays and holdup of production.

Here is a great cost-reducing machine with advanced principles of design which provide precision grinding results on a high production basis whether grinding one large part or a number of small parts.

Write for free Set-Up Book, containing further examples, showing how others have reduced time and increased production with Mattison Grinders.

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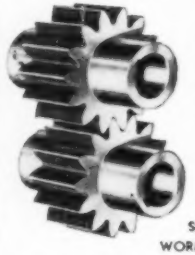

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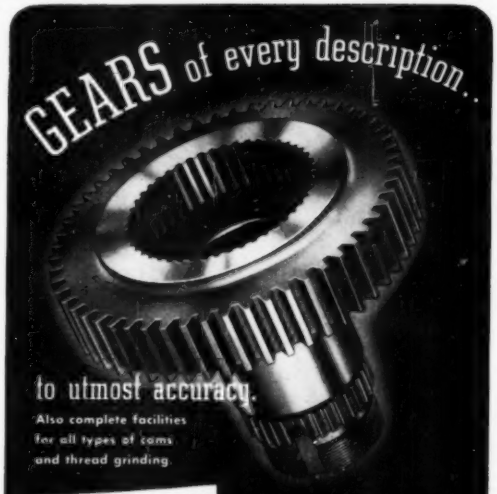

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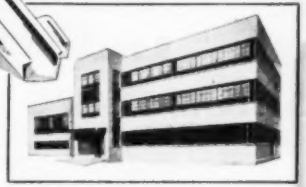
Visit Hanson-Van Winkle-Munning headquarters, Hotel Schroeder at the A.E.S. Convention, Milwaukee, Wisconsin, June 27th through 30th, 1949.



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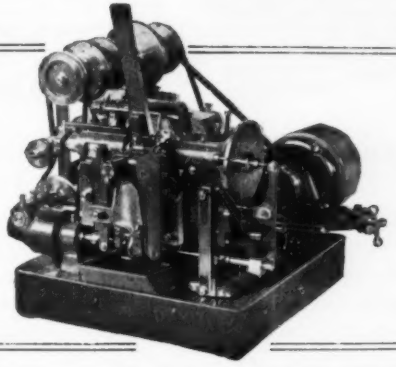

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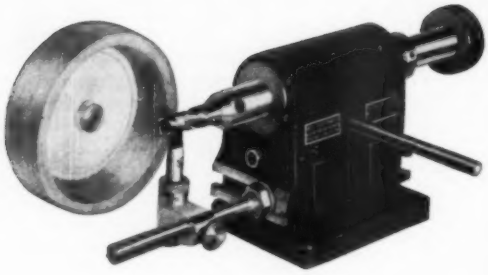

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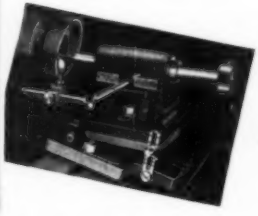
END MILL
SHARPENING FIXTURE

The *Weldon* Sharpening Fixture quickly resharpens end mills from 1/16 to 2" inclusive. Requires no centers or lead cams. Unnecessary to line up the fixture as it will always grind straight. Designed for any grinder with flat table. No table movement necessary. Requires little skill to operate.



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ADJUSTABLE
SUB-BASE

makes sharpening end teeth easy

Designed for easy attachment to the Weldon Sharpening Fixture the Sub-Base adjusts to any selected angle and makes simple the job of sharpening the end teeth of all style end mills. No alterations needed. Simply bolt to Fixture through same slot used to fasten Fixture to grinding machine.

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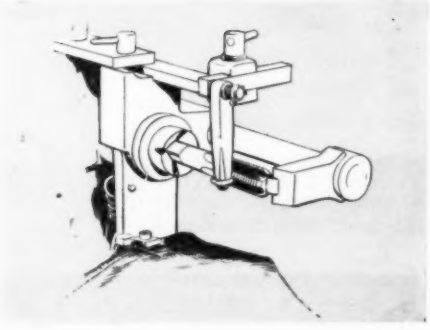
THE WELDON TOOL CO. *Cleveland, Ohio*

3000 WOODHILL ROAD

Accuracy requires positive mechanical controls



Ask for your copy of Bulletin 549-M and learn how the mechanical controls on a Blake Tap Grinder assure accuracy.

EDWARD *Blake* COMPANY

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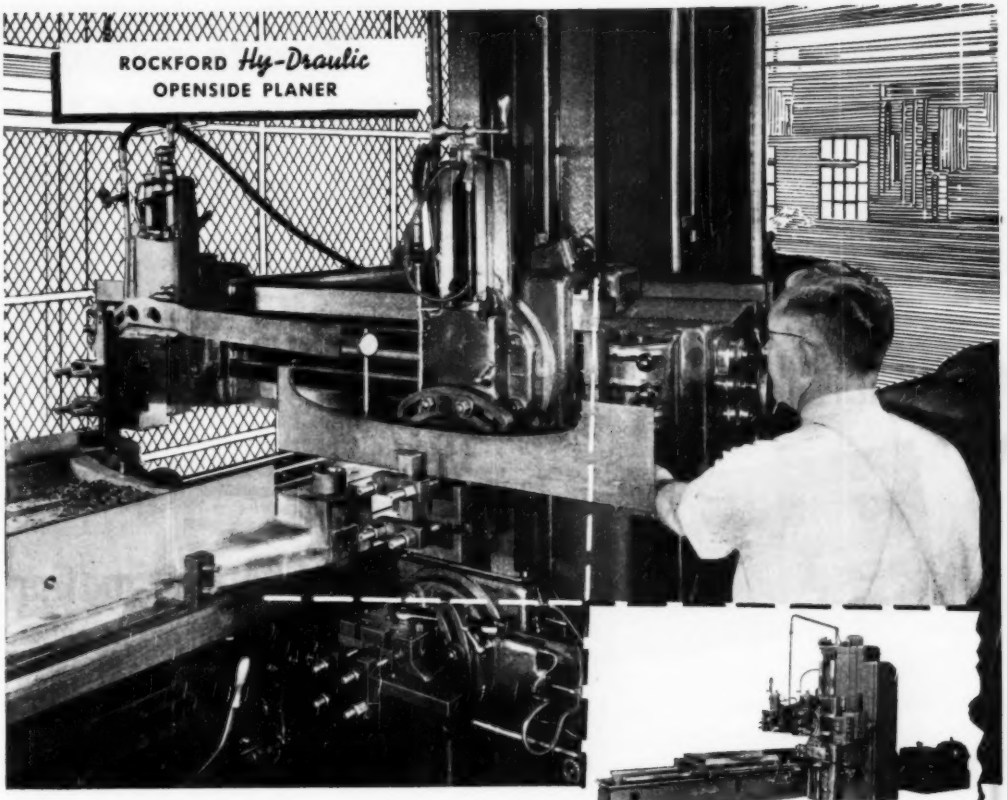

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The work illustrated above is a good example of the greater available accuracy that's yours with a Rockford Hy-Draulic Planer. A tolerance of plus 0.002" minus 0.000" is held in contour planing inside surfaces on a cam flange die. This is a final machine finish to be followed by hand polish finish only.

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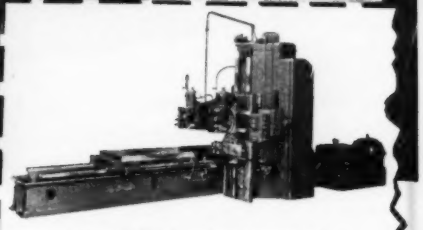

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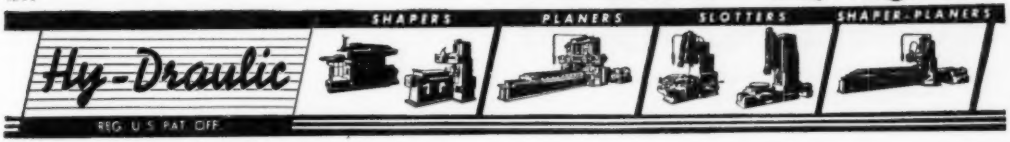

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eliminates human variables in surface control — takes exact readings electronically, right on the production line!

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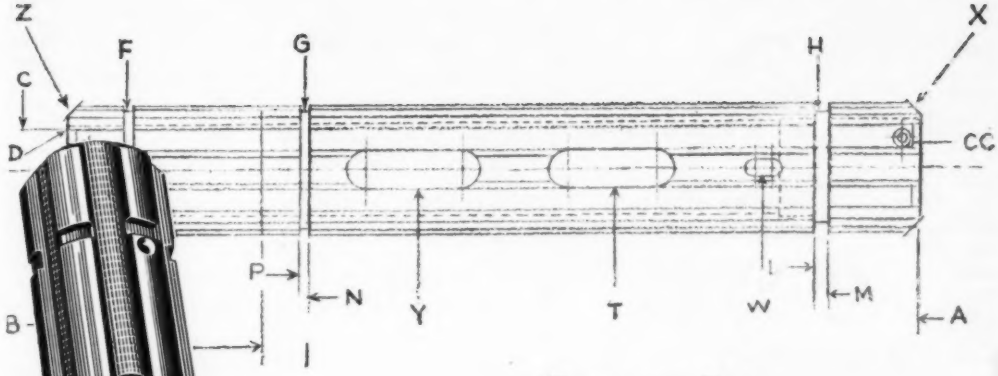

the tube that helps pay for itself

IT takes 20 operations—from broaching to final milling—to make this tubular spline shaft. Cost of this machining sequence makes the finished shaft a stiff rejection risk . . . only quality seamless tubing can be used for the job. The tubing used in this particular instance, however, helps pay for itself in the bargain.

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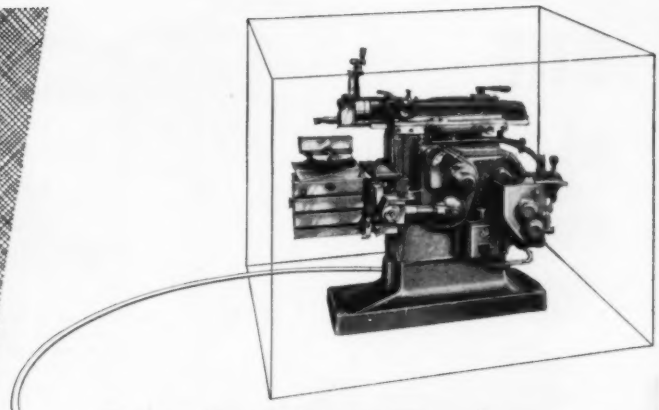

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Strokes per minute	14 to 200
Speed changes	8
Vertical travel of tool slide	4⅝"
Table top tilts either way	15°
Max. distance vise to ram	8 13/16"
Max. rotation of table	360°
Max. vise opening	10½"
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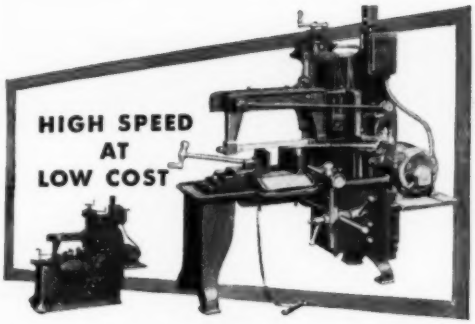

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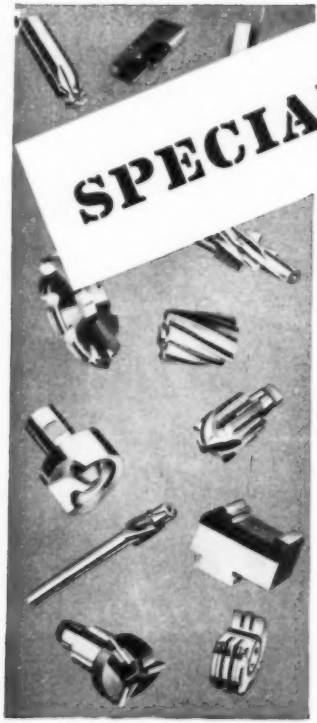

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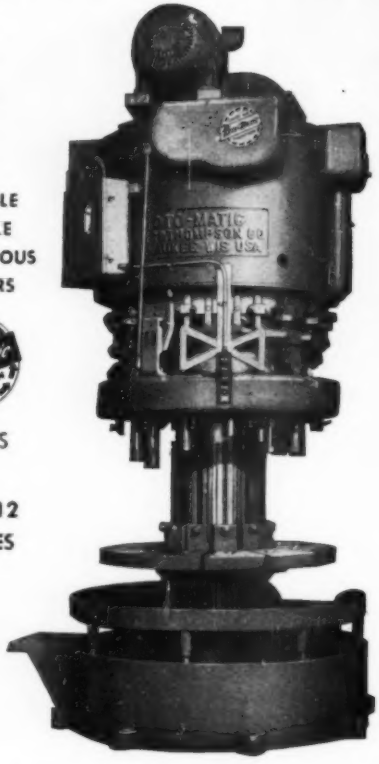

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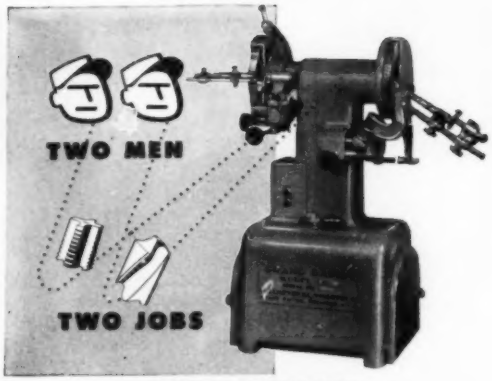

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2 LATHES—*The Monarch Machine Tool Co., Sidney, Ohio.* One 34-page, one 20-page and one 22-page bulletin cover the Monarch engine and toolmakers lathes, Series 60, the Speedi-Matic hand-operated screw machine, and the Monarch Model EE, 10-in. sensitive precision toolmakers lathe, respectively.

3 LATHES, DRILLPRESS, SHAPER —*South Bend Lathe Works, South Bend 22, Ind.* 16-page catalog No. 22 covers the South Bend Precision Machine Tools and includes the 13- and 14½-in.—1-in. collet lathe; the 14-in. drillpress, 7-in. bench shaper and many others. Catalog is thoroughly illustrated.

4 PRESSES—*Rodgers Hydraulic, Inc., Minneapolis, Minn.* 18-page bulletin 313 includes construction and operation features and specifications of standard and special shop presses from 60 to 400 ton. Also included is description of hand and power pumps and press accessories.

5 GEAR HOBBER—*The Hamilton Tool Co., Hamilton, Ohio.* 4-page folder No. H-1-49 presents precision spur, spiral and bevel gears, gear sectors, spline shafts, pinions, and worm gears.

6 SUCCESS STORY—*National Automatic Tool Co., Inc., Richmond, Ind.* 4-page folder called, "Success Story of Production Avenue, USA," is the second of a series of case histories.

7 HYDRAULIC PRESSES—*The Baldwin Locomotive Works, Philadelphia 42, Pa.* 12-page bulletin 285 illustrates nearly 40 hydraulic presses for forming, drawing, forging, extrusion, plate working, bending, crimping, joggling, straightening, and others. Capacities range from a 5-ton bushing press to a 5500-ton rubber pad press.

8 SURFACE GRINDERS — *Gallmeyer & Livingston Co., Grand Rapids 2, Mich.* 26-page booklet describes the hydraulic-feed surface grinders. Various models are illustrated with specifications.

TOOLS AND ACCESSORIES

9 CARBIDE TOOLS—*Willey's Carbide Tool Co., Detroit 1, Mich.* 66-page catalog, spirally bound, is divided into two sections—the first dealing with blades, broaches, bars, dies, drills, gage bushings, mills, reamers, saws, tips and tools, and the second with diamond tools and mechanical dressers.

10 CUTTING TOOLS FOR LIGHT METALS—*National Twist Drill & Tool Co., Rochester, Mich.* 24-page booklet covers twist drills, reamers, router bits, counterbores, inverted spot facers and gives thorough specifications.

11 SAFE SPEEDS FOR GRINDING WHEELS—*Grinding Wheel Institute, Greendale, Mass.* 18-page bulletin contains established rules for efficient operation and safe speeds for grinding wheels. Contents include: maximum peripheral speeds, strength classification of grinding wheels, definition of maximum speeds, effect of wheel speed on grinding action, and others.

12 TESTER—*W. C. Dillon & Co., Inc., Chicago 44, Ill.* Four, 2-page folders, M, D, L, and T, describe the Dillon multi-low-range universal tester, dynamometer, universal tester, and the Dillon stainless steel thermometer, respectively. Dynamometer measures traction, tension, or weight. Thermometers are available in 5-, 3-, 2¼- and 1-in. dial sizes with stem lengths from 4 to 42 in.

13 BOREAMING—*Madison Mfg. Co., Muskegon, Mich.* 34-page bulletin contains information on rough-boring tools, finish boring tools, Madison Boreamers, special multiple-cutting tools, and special tools for bottoming. Production tolerances as low as 0.002 can be held at high speeds.

14 WRENCHES, SHOP TOOLS—*The Billings & Spencer Co., Hartford, Conn.* 100-page 8½x11 catalog 49 illustrates and describes complete line of wrenches and shop tools. Numerical index with weights and standard packaging for each product listed are given as well as individual page index and tables of data.

15 PLUG GAGES—*Standard Gage Co., Inc., Poughkeepsie, N. Y.* 6-page folder shows various types of DuBo gages. Diagrams show how to use gages for checking.

16 TESTING MACHINES — *Detroit Testing Machine Co., Detroit 13, Mich.* 8-page folder lists various Brinell hardness testers, sheet-metal testers for ductility, tensile testing machine, and universal testing machines. Specifications are included.

17 BURS AND ACCESSORIES—*Pratt & Whitney, Div. Niles-Bement-Pond Co., West Hartford 1, Conn.* 40-page booklet is revised and enlarged, and includes information on the Di-bur for use on die steels. Booklet is thoroughly illustrated and contains specifications.

18 LIVE CENTERS—*Marvel Tool & Machine Co., St. Clair, Mich.* 8-page pamphlet describes the various types of live centers for lathes, grinders, threadmills and other machinery.

19 CEMENTED - CARBIDE PRODUCTS—*Kennametal, Inc., Latrobe, Pa.* 76-page catalog gives specifications and prices of the complete line of cemented-carbide tools. Tools are indexed. Data on Kennametal and its diversified applications as a cost-cutting material are also presented.

20 LUBRICATION EQUIPMENT—*Alemite, Div. of Stewart-Warner Corp., Chicago, Ill.* 48-page catalog covers the Alemite line of industrial lubrication equipment. Parts are illustrated and specifications are included.

HEAT-TREATING AND WELDING

21 RODS, FLUXES—*All-State Welding Alloys Co., Inc., White Plains, N. Y.* 32-page pocket-size handbook lists All-State rods and fluxes and includes new items. It contains tables of characteristics, full application information and hints of general interest.

22 GAS WELDING SUPPLIES—*Air Reduction Sales Co., New York 17, N. Y.* 16-page folder describes 19 different gas-welding rods, eight fluxes, and includes a section on silver-brazing alloys, plus a page devoted to carbon rods, and carbon plates.

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PARTS AND MATERIALS

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48 NITRALLOY STEEL—*Joseph T. Ryerson & Son, Inc., Chicago 80, Ill.* 8-page bulletin describes Nitralloy, a special alloy steel suitable for extreme wear and abrasion resistance. Included is table of Nitralloy compositions, hardness curves, mechanical properties, information on nitriding and heat-treatment, and typical applications.

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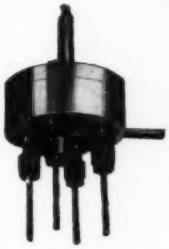

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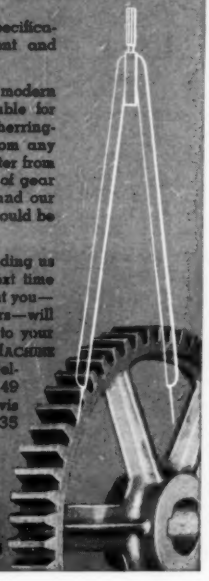

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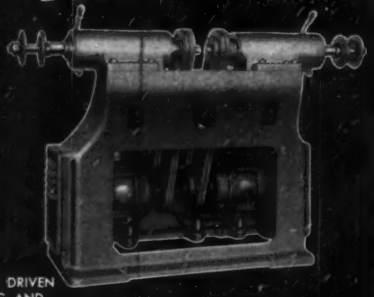

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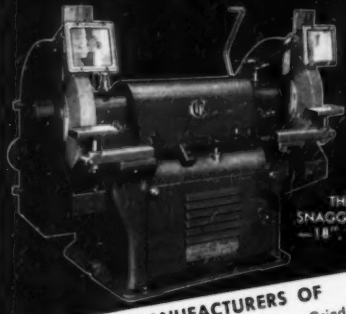

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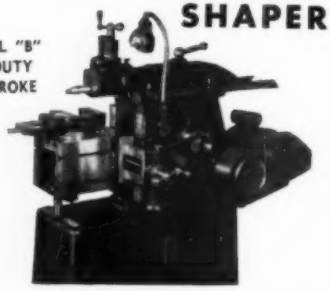

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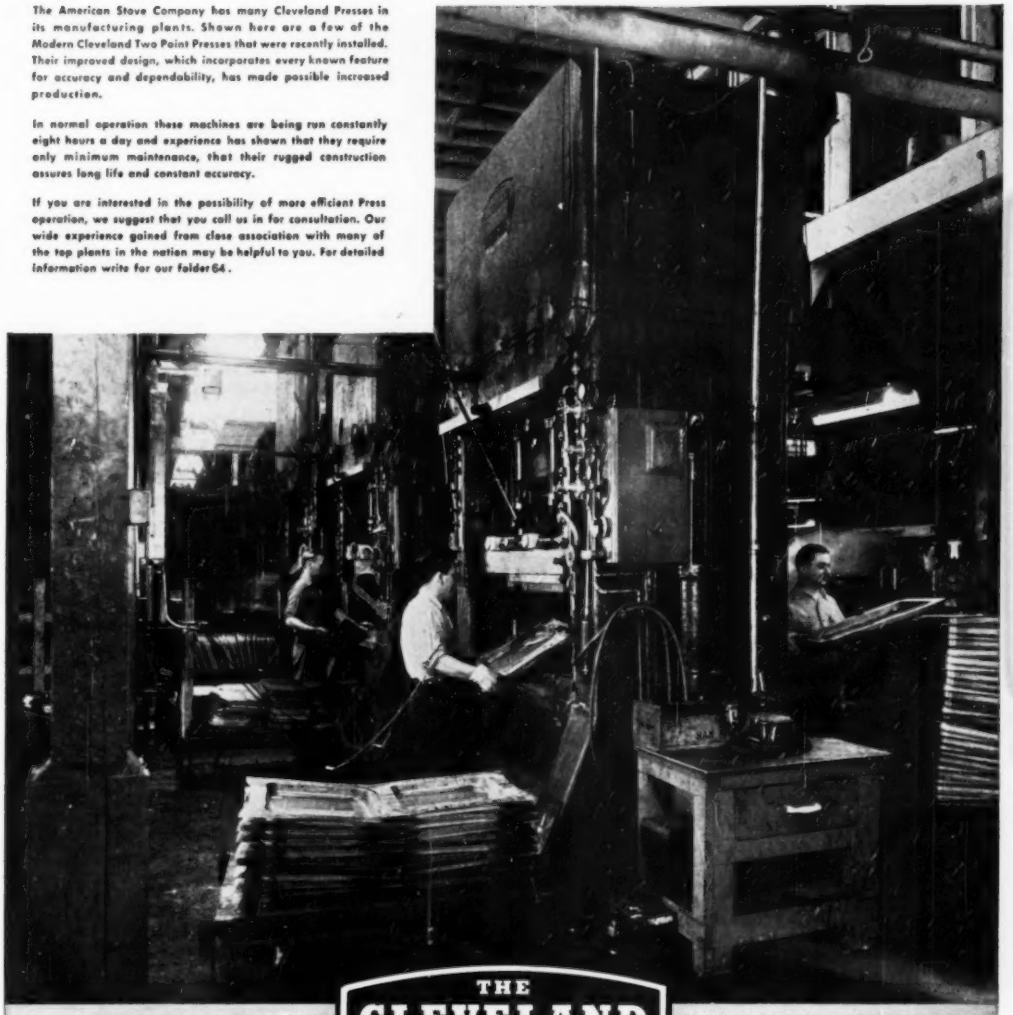

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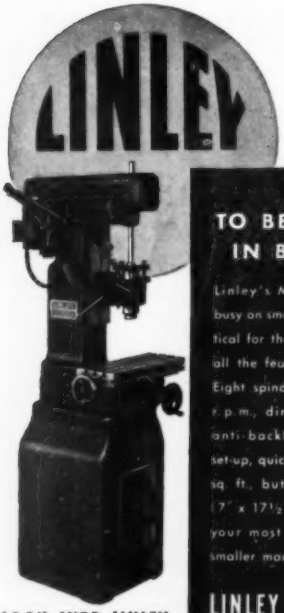

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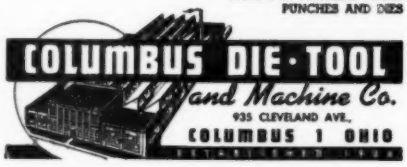

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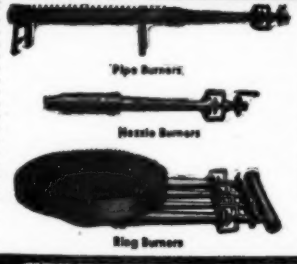

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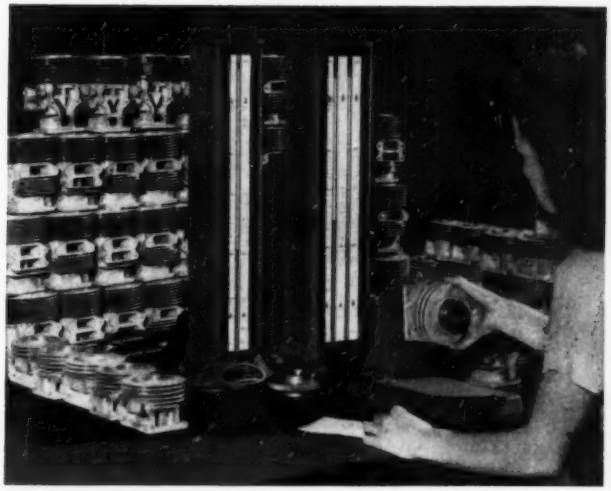

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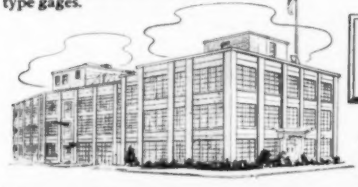

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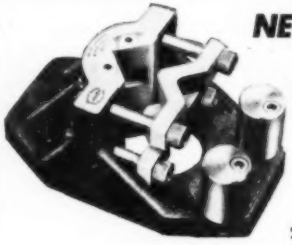

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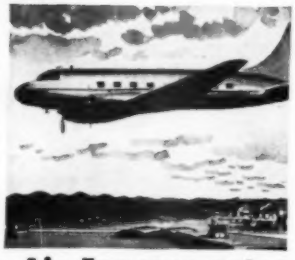

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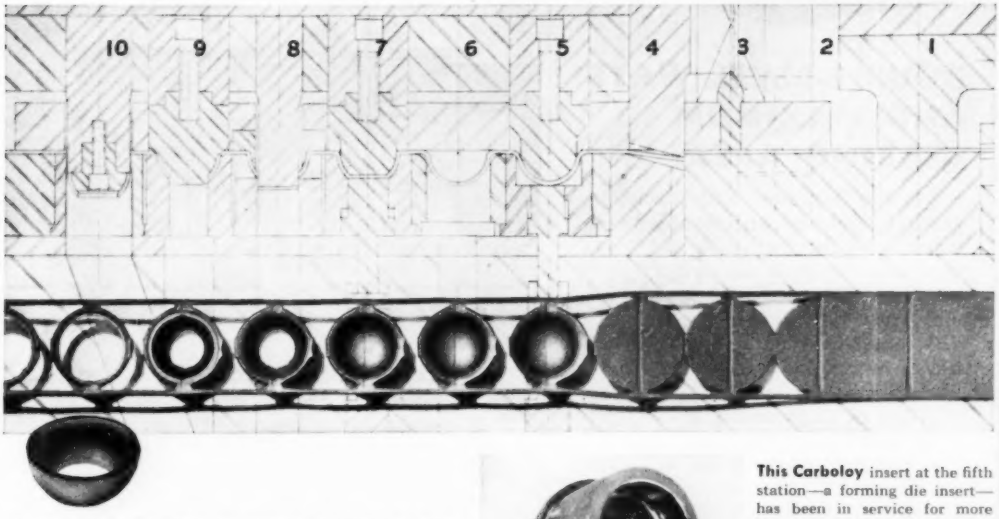

In many multiple-station operations, one or two stations carry considerably more stress than the others.

On this job, can you tell which stations carry the greatest stress? You might be surprised at the savings made by converting only those stations to Carboloy dies!

You'll often find that major savings and vastly increased production can be effected without changing to carbides on all stations.

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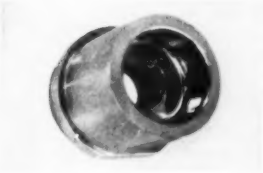

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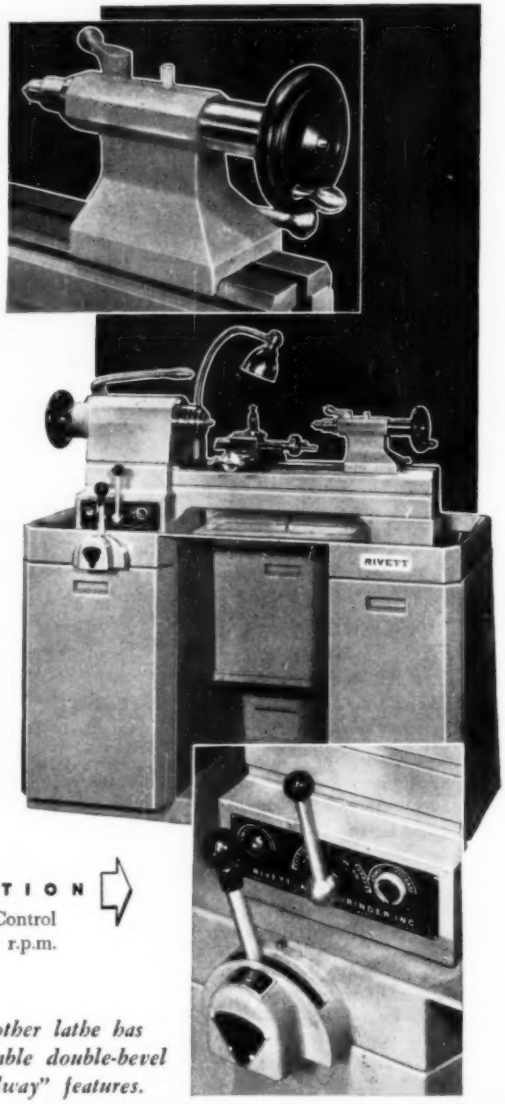

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No. 20 PH 4.D. Cook Deewell Pump with Chrysler Engine and 200' of 8" pipe, brand new

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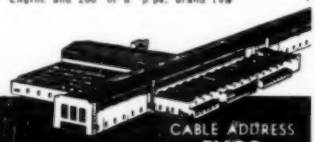
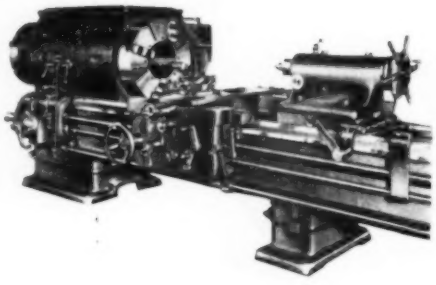


THE EASTERN MACHINERY COMPANY
1004 Tennessee Avenue, Cincinnati 29, Ohio
MElrose 1241
CABLE ADDRESS EMCO

EMERMAN *Offers from* STOCK



27" x 38' LEHMAN HYDROTROL OIL COUNTRY LATHE
9" Hole in Spindle—30' Centers
12 Speeds; 5 to 150 R.P.M.
Double Timken Precision Bearing, Taper Attachment
Power Rapid Traverse with Motors and Controls

Bridgeford .....30" x 30'
10" Hole Thru Spindle
24' Between Centers
Taper Attachment

EMERMAN MACHINERY CORP.
875 W. 120TH STREET — CHICAGO 43, ILLINOIS

POWER PRESSES
BLISS, TOLEDO, V & O, ETC.
REBUILT – GUARANTEED
MONA
JOSEPH HYMAN & SONS
Tioga, Livingston and Almond Streets
Philadelphia, Pa.

2—Lodge & Shipley Duomatic lathes
2—Potter & Johnston 25 DE Chucking machines
1—D. E. Whiton 216 gear cutter
1—Monarch Lathe, 22 x 48"
1—3 spindle Gould & Eberhardt spur gear and bevel rougher
1—Heald double spindle Borematic
SIER-BATH GEAR & PUMP CO., INC.
9252 Hudson Boulevard, North Bergen, N. J.

Nos. 00G, 0G & 2G B & S High Speed Autos.
Nos. 1, 2, 3 & 5 W & S Turret Lathes.
American 18"x10' Geared Head Lathe, M.D.
D. E. DONY MACHINERY CO.
47 Laurelton Rd., Rochester 9, N. Y.

BUY FROM STOCK
Telephone
HAMILTON 8744-45

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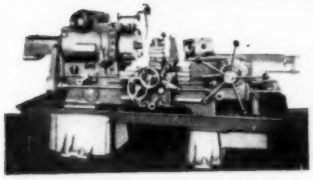
Every Item Guaranteed as Represented



Gisholt #4 Universal Grd. Head Ram Type Bar Feed Turret Lathe. 2" Capacity. 12 speed hd. Hydraulic Speed Selector. Has tooling & coolant system.

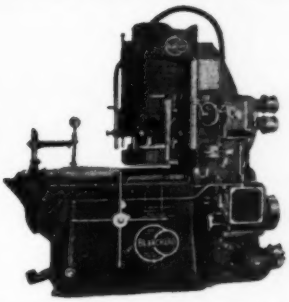
TURRET LATHES

Bardons & Oliver #1 Electric Turret Lathe. ¾" cap. Has bar feed & collets.
Morey #2 Geared Head 1" Cap., M. Dr.
Simmons Microspeed 1" Cap., M. Dr.
Oster #601 Hand Screw, Machine 1½" cap.
W-Swasey #4 Univ. 1½" cap., M. Dr.
Jones & Lamson #3 Univ. Bar Feed 1½"
W-Swasey #3 Univ. 1½" cap., M. Dr.
Bardons & Oliver #7, Univ. 2½" Cap.
W-Swasey #3A Univ. 1½" cap., M. Dr.
Warner Swasey #1A Universal Heavy Duty Saddle Type Turret Lathe. Serial #648220. Capacity—2½" rd., Grd. Hd. 12 speeds. Coolant system, bar feed, chuck & tooling. Immediate delivery Excellent condition.

Dreis & Krump #458D Motor Driven Power Press Brake. Serial #5439. 7½ h.p. 3/60/220/440 volts motor. Also ram motor. Push button controls. Capacity—8'x¼" steel and lighter. Takes 8'6" between housings. Throat—8". Stroke—3". Die Space—12". 30 strokes per minute. Has Standard Die Holders, also Adjustable gauges.

ENGINE LATHES

LeBlond 36"x30' Q.C.G. Hvy. Duty Geared Head Screw Cutting Engine Lathe. Serial #NK-230. 12 Speed Head. 36" internal grd. faceplate, Taper Attachment, Dial Thrdg, Set of toolholders. Max Swing—39". Centers—22'6". 25 h.p. 3/60/220/440 volts V-belt drive.
24"x16' American Q.C.G. Motorized Cone Head. 11' centers. Taper Attachment. 24" chuck, faceplates, cabinet type legs. 220/440 volts motor & controls.
24"x12' Putnam Motorized. On raising blocks to swing 32" with 66" c.c.
20"x11' Schumacher-Boye, Q.C.G.
20"x10' American, Q.C.G. 72" centers.
20"x10' Hendey Motorized.
20"x8' Lodge & Shipley. Q.C.G. M. Dr.
18"x8' Davis Q.C.G. 42" centers, equipment.
18"x8' Lodge & Shipley, geared head.
18"x8' Hendey Q.C.G. 49" centers.
18"x6' American, Geared Head, M.D.
16"x12' South Bend Q.C.G. Enclosed Head underdriven with 1½ h.p. motor & controls. 105½" centers. NEW—1946. Has chuck, turret tool post, 2-steady rests, faceplates. Excellent condition. Immediate delivery from stock.
16"x8' Hendey Q.C.G. M. Dr.
16"x6' Lodge & Shipley Geared Head.
16"x6' Lodge & Shipley "Patent Head," Motor Dr.
16"x6' South Bend Enclosed Head; Motor driven. Taper Attachment, Chucks, Collets & Quick Acting Collet Chuck.
14½"x6' South Bend Enclosed Head, Motor Driven, Taper Attachment, Chucks, Turret Toolpost Threading Dial, Ram Type Turret Attachment, Collets & Collet Chuck.
14"x8' Reed-Prentice Eight Speed Selective Geared Head, Q.C.G. Motor driven w/220/440 volts motor & controls. Has Taper Att. chuck, faceplates, steady rest, cabinet legs, max. centers —48". Completely rebuilt. Immediate shipment.



Blanchard #16 Motor Driven Vertical Rotary Surface Grinder. 26" Chuck with power down feed to head. Built-in coolant system.

GRINDING MACHINES

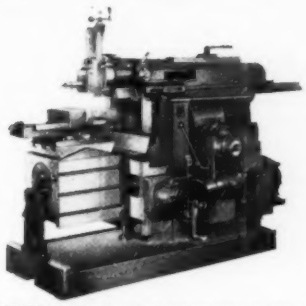
Cincinnati 10"x36" Plain Hydraulic Cylindrical Model #EA. Serial #5P2D1L-19. Filmatic Bearings. Built-in Electrics. Hydraulic Infeed.
Heald #22 & #25, 12" & 16" Horizontal Rotary Surface Grinders. Motor driven.
Cincinnati 'Monoset' Model #OE Cutter & Tool Grinder. Motor driven. With motors & controls. Set of collets, taper & cylindrical and equipment.
Thompson 6x18 Hydraulic Horiz. Surface. Wet & dry work. 220/440 motor driven. Auto, downfeed to head. Motor driven exhauster unit.
Gallmeyer & Livingston #4 Motor Driven Universal Tool & Cutter Grinder. W/Internal Attach. & Thrd. Chaser & Equipment. Motor driven coolant.
Norton 6x18 Vertical Rotary Automatic Surface Grinders. 220/440 volts motors. Excello Spindles. Hydraulic Table feeds. Three Available with immediate delivery. Also 6x18 Horizontal.

AUTOMATICS

#OG & #00 Brown & Sharpe Automatic.
#2G Brown & Sharpe Standard Speed. 220/440 volts motor & push button controls. Complete coolant, turret tooling, collet & collet chuck, toolblocks. FOUR AVAILABLE—FROM STOCK.
#2 Brown & Sharpe Automatic Turner drive 220/440 volts motor. With Stock stands, collet, toolposts, coolant system, change gears. FOUR AVAILABLE.
Cleveland Model "A" 3¾" capacity Single Spindle Motor Driven Automatic. Has lot of tooling, collets, motors and switches & coolant system.

PUNCH PRESSES

O.B.I. Johnson (NEW) all sizes, geared & plain.
O.B.I. Federal #3, 26 tons cap. motor dr.
O.B.I. Toledo #5, 44 tons cap. motor dr.
O.B.I. Bliss #18, 19C, 20, 20B, 21 motorized.
O.B.I. Michigan, 36 tons cap. Wide ram & bed.
Geared S.S.S.A. Bliss #305 Motor driven.
Wheel Press, Niles, B & Pond Horiz. Hydraulic. 200 tons cap. 48" between strain bars.
Stamping, Ferracute #86 Wide Frame, 61½" between housings. 13¾" stroke. Motor driven.
Backflywheel, Ferracute #P4, 50 tons cap. 15"x24" bed, 2" stroke. 220/440 direct gear motor drive w/controls.
Transfer, Nilson 56 tons S.S. Dble. Crank 3-Die.



GEMCO 20" Standard Duty Universal Motor Driven Shaper. (NEW) Power Rapid Traverse horizontal & vertical. 8 Cutting Speeds, 18 cross feeds. 5 h.p. 3/60/220/440 volts V-belt drive. With 12" Vise & set of wrenches. Immediate delivery.

SHAPERS

Shaper—Columbia 32" B.G. Crank motorized Power downfeed to head.
Shaper—Logan 7" Horizontal. NEW.
Shaper—Machinery Sales 16", motorized.
Shaper—Smith & Mills 16" motorized.
Shaper—Smith & Mills 16" Universal.
Shaper—Gould & Eberhardt 16", motorized.
Shaper—Gould & Eberhardt 18" B.G. Crank.
Shaper—American 24" crank, motorized.

MILLING MACHINES

Nichols Head, Late Type, M.D. (six)
Hardinge B.B. Vertical, Bench.
Becker #5C Vertical, Cone Dr.
Cincinnati #3, #4, #5 Pl. Horiz.
Brown & Sharpe #12 Production, 18" Autom.
Brown & Sharpe #12 Production, 24" Autom.
Brown & Sharpe #0, 1, 1Y Horizontal.
Kempsmith #1, #2 Plain Horiz.
Cincinnati 18" Mfg. Plain.
Milwaukee #2K Vertical, M. Dr. Dial Type.
Milwaukee #3K Vertical, M. Dr. Dial Type.
Milwaukee #11½ Dbl. Overarm, Horiz.
Milwaukee #2B Dbl. Overarm, Horiz.
Milwaukee #3B Plain Horizontal.
Pratt & Whitney #2 Duplex, Motorized.
#3 Dial Type, H.S. Cincinnati Vertical Mill. Power Rapid Traverse, speeds up to 1300 r.p.m. Range—34"x16"x16" Head has 6" vertical with four stop indicator. Serial #4A3V1L-61. Timken Bearing. 10 h.p. motor drive in base. Two available.

UNIVERSAL MILLING MACHINES

Ames Bench, 12" x 3" x 7½" W/Index Hd.
Index #40H, 16"x81½"x16"
B & S #2, 20"x5"x17½"
B & S #1½, 20"x7"x18".
Bridgeport, 20" x 9" x 16" Turret Type.
B & S #1D, 24"x8"x15".
Garvin #2MU, 24"x8"x18".
K & T "Milwaukee" #2, 28"x10"x17".
Kempsmith #2, 28"x8½"x18"
Cincinnati #2, 28"x10"x18".
Cincinnati #2M, 28"x10"x18".
B & S #3, 34"x10"x21".
Cincinnati #35, 34"x12"x20".
Some w/index heads & equipment.

RADIAL DRILLS

Cinci-Bickford 6' Arm, 15" Col. 24 Speeds.
Cinci-Bickford 5' Arm, 13" Col. 24 speeds.
Fosdick 5' Arm, 14" Col. Hvy. Duty, Motorized.
American 4' Arm, 11" Col. Motor on arm.
Cinci-Bickford 3' Arm, 9" Col. 12 Speeds.

CHOOSE CIMCO TESTED TOOLS FOR PRODUCTION ECONOMY

AUTOMATICS

Conomatic 1⅞", 8 spindle
Cleveland, Model AA-08

BORING MILLS

Cleveland #1, 2½" bar, MD (Horiz.)
Lucas #41, 4½" bar, MD (Horiz.)
Bullard New Era, 24", Side Head, MD
King 36", one rail head, MD
Bullard Maxi Mill 54", two rail heads, MD
DeBance #6 Horiz. 4½", MD

LATHES—ENGINE & PRODUCTION

American 14"x6'—14"x8', 3 SCD, BG, Bowl Head
American 16"x6'—16"x8', 3 SCD, D.B.G.
American 16"x6'—16"x8' GH, MD
American 18"x6'—18"x8'—18"x10' GH, MD
American 18"x8'—18"x10' 3 SCD, DBG, Bowl Hd.
Boye & Emmes 18"x6' SCEL
Boye & Emmes 18"x8' SCEL
Boye & Emmes 20"x10' SCEL

LATE TYPE

Boye & Emmes 16"x54" GH & QCG

Boye & Emmes 24"x16' HD, GH
Boye & Emmes 26"x16' QCG, MD
Hendey 14"x6' Model EBM, Tool Room, MD
Hendey 16"x6' 4 SCD, Yoke head
Hendey 18"x8' 4 SCD, Yoke Head, Tool Room
LeBlond 14"x8'—14"x8' 4 SCD, BB
LeBlond 14"x6' GH, MD, BG
LeBlond 17"x6'—17"x8' GH, MD
LeBlond 17"x6' 3 SCD, HI Duty, DBG
LeBlond 21"x6'—21"x10' HD, 3 SCD, DBG
Monarch 14"x6' 3 SCD, DBG
Monarch 16"x6'—16"x8' GH, MD
Monarch 20"x10' Model BBiG Speed, GH, MD
Reed Prentice 16"x8' GH, MD
Sebastian 16"x8' 4 SCD
Lodge & Shipley 15"x6'—16"x8' Selective GH, MD
Lodge & Shipley 18"x8'—18"x16' Selective GH, MD
Lodge & Shipley 18"x54" centers GH, Latest Type
Lodge & Shipley 18"x8'—18"x10' 3 SCD, DBG
Sebastian 20"x8' GH, MD Very Late Type
American 24"x12', 2 speed GH, SCEL
American 24"x12', 8 speed GH, SCEL
American 24"x16', GH, SCEL, MD
Ohio 29" Back Geared 4 SCD
American 30"x26' GH, SCEL, MD
Lodge & Shipley 24"x14', SCEL, 3 SCD, DBG
LeBlond 25"x12' HD, QC, SPD, SCEL
LeBlond 25"x16', HD, 3 SCD, SCEL
Niles Timesaver 30"x16' (First Class Cond.)
Lodge & Shipley 36"x26', Patent Head, SCEL

GEAR CUTTERS

Gleason 3" Bevel Gear Generator, SPD
Gleason 6" Bevel Gear Generator SPD
Gleason 15" Spiral Bevel Gear Generator
Barber Coleman Model S for Precision Gears
Fellows #815 Helical Spur Gears MD
Fellows #8 Cuts internal & external
Pfauter #R2 Hobber, 40" Cap.
Gould & Eberhardt 36" S Automatic Gear Cutter
Gould & Eberhardt 10 H Gear Hobber, MD
Brown & Sharpe 26", 36", 48" and 60", SPD
Cross, #1 Gear Tooth Rounder

GRINDERS—ALL TYPES

Landis 4"x12" Type H, Plain Cyl.
Landis 10"x24" Type C Hyd. Univ., Latest
Landis 12"x72" Plain Cyl. M.D.
Landis 16"x72" Plain Cyl. Self Contained, MD
Landis 20"x220" Plain Cyl. Self Contained, MD
Landis Chaser Grinder, Model Y MD
Norton 10"x24" Type BA Plain Cyl. M.D.
Norton 16"x24" Type BA Plain Cyl. MD
Cincinnati 12"x48" Plain Cyl., MD
Brown & Sharpe #2 Univ., Belt Drive
Heald 72A3 Internal, Complete, MD
ExCello 31L Precision Thread MD
Rivett 104-2, Internal MD
Cincinnati No. 3 Centerless
Gardner #12B A 51 Opposed Wheel Grinder Latest type
Pratt & Whitney 10" Spiral Gear, 2 Wheel type
Thompson 6"x18", 6"x24" Type F Hyd. Surface
Norton 6"x18" Surface Grinder, MD
Arter Model A 3 12 Surface Grinder, MD
Heald 25A Rotary Surf Hyd. 16" Chuck, 1943
Thompson Model 10C, 10x16x120 Hyd. Surface Grinder
Norton 10"x144" Centers Cyl. Grinder

LATHES—TURRET

Gisholt #3 Univ. Ram Type, New 1943
Gisholt, #3L, Saddle Type, Hardened Way, MD
Warner & Swasey #2A Hollow Hex
Warner & Swasey, #3 Univ. Late type
Warner & Swasey #3A Univ. Timken Bearing, MD
Jones & Lamson 3½"x32" Flat Turret, MD
Gisholt, #2L, Univ. New 1943

SHAPERS & SLOTTERS

Smith Mills 15" single pulley drive GB
Gould & Eberhardt 16", 20", 24" V ram, Cone drive BG
Gould & Eberhardt 16" Univ. MD
Cincinnati 16", 24" Back Geared, Cone Drive

GUARANTEED MACHINERY

Cincinnati Machinery Co., Inc.
219 East Second Street
Cincinnati 2, Ohio

AUTOMATICS

No. 16 New Britain 6 spdl. chucking
No. 454 New Britain chucking
14"x19" Fay Chucking
8" Bullard 6 spindle Mult-Au-Matic
½", No. 0G Brown & Sharpe
9/16" Acme Gridley Model R6
⅞" & 1¼" Cone spindle
1" Economy shaver, hopper feed
1-1/16" Cleveland 4 spindle
1⅜" New Britain, Model 61
1⅞" Conomatic 8 spindle
2"x18" Cleveland Model B
2⅝" Acme Gridley Model RA6

BORING MILLS

100" Niles Bement Pond vertical
52" King vertical
24", 30" & 42" Bullard vertical
2½" bar, No. 25 Giddings & Lewis
3" bar, No. 3A Universal
3¼" bar, No. 5A Defiance
3¼" bar, No. 32 Lucas
5" bar Jones, planer table type
Nos. 112B & 2112 Excello precision
Nos. 42, 47A & 48A Heald Borematic

GRINDERS

10"x72" Colonial broach grinder
Nos. 33 & 35 Excello thread
Nos. 1 & 2 Brown & Sharpe univ.
10"x24" Landis hydr. universal
No. 2 Norton univ. tool & cutter
28", No. 22B Gardner disc
53", No. 372 Besly horiz. disc
No. 115 Gardner opposed disc
No. 230 Hanchett opposed d sc
No. 2 Cincinnati centerless
No. 510 Oliver drill grinder
Nos. 6G & 10G Sellers drill grinders
Norton, 6"x18", 10"x36" & 23"x36"
Landis 6"x18", 14"x36"
No. 2B Brown & Sharpe surface
12"x48" Thompson surface
14"x60" Mattison surface
No. 34 Abrasive surface
16" & 24", No. 25A Heald surface
12" & 16", No. 22 Heald surface
Nos. 72A3, 72A5, 74 Heald internal
No. 72A3 Heald Sizemat c
No. 72A3 Heald Sizematic centerless
Nos. 16A16, 16-20, 16-30 & 24-36 Bryant

LATHES

36"x16' Bridgeford
25"x48" centers Leblond
20"x8' Lodge & Shipley
18"x8' Rockford
16"x30" centers Monarch
16"x5' Sebastian
14"x6' Lodge & Shipley

LATHES, TURRET

Nos. 2, 4, 5, 1A & 3A Warner & Swasey
Nos. 5 & 7 Bardons & Oliver
Nos. 3, 4 & 3AL Gisholt
24" & 42" Bullard vertical
No. 62 Denver
No. 4 Midland
Nos. 2G & 3 Morey
3"x36" & 4"x34" Jones & Lamson

SHAPERS & PLANERS

6" Pratt & Whitney vert. shaper
16" Bement Miles slotter
16", 20", 24" & 28" G&E shapers
22" & 24" Gemco univ. shapers
24" Columbia univ. shaper
30"x24"x6' Liberty openside planer

SHEET METAL TOOLS

8'x¼" Cincinnati press brake
8' x 10 ga. Dreis & Krump leaf brake
10' x 14 ga. Dreis & Krump leaf brake
8' x 10 ga. Beloit bending roll
No. 202½ V. & O. thread roller
72" x 14 ga. Wysong & Miles shear
60", 14 ga. Pettingell rotary shear
Nos. P1, P2, P3, P4, P5 Ferracute presses
Nos. 18 & 19 Bliss OBI presses
No. 6 American Can OBI press

MILES MACHINERY CO.
SAGINAW, MICH.

McDONALD
USED MACHINERY

G & E 24" Cin. 32" Shapers
Cleveland O.S. Planer 36"x8', 2 hds.
Abrasive No. 34 M.D. Vert. Surf Grinder
Cincinnati D. H. Planer 36"x36"x10', 2 hds.
Monarch 20" grd. hd., M.D. Lathe 16 sp. Speeds Model "M"
Bulard Vert. Turret Lathes, 24" & 36" S. Head
Defiance 3" Horiz. Boring Mill & Univ. No. 3-A
L & S 18x12' & 20'x10', 20'x8' Grd. Hd., M.D. & 28"x12' Lathes Monarch Model "C"
American 24x12 grd. hd. lathe, m.d. q.c.g.
American 4-ton vert. Hydr. Broach
Blanchard Vert. Surf. Grinder, 26 rd. chuck
Cincinnati No. 2 Centerless Grinder
Colburn 60" & 72" Vert. Boring Mills
Cincinnati 1-M grd. hd., Univ. tool room Miller.
Cincinnati No. 5 H.P. grd. hd, S.P.D. Pl, Miller.
W. & S. No. 2A grd. hd, Univ. Turret Lathe, S.P.D.
Foster No. 2F Ostermatic grd. hd. Turret Lathe, M.D.

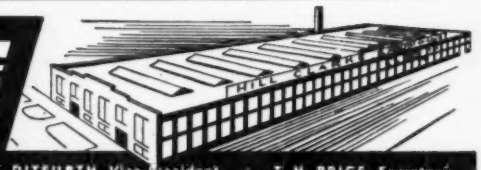
MONA gauges

McDONALD MACHINERY CO.
1531-35 No. B'way., St. Louis 6, Mo.

AUTOMATICS—Natl. Acme 1⅝", four spindle, Bargain (2)
GRINDER—(Rotary) Blanchard 25" mag. chuck, belt—$500.00
HYDROHONER—Micromatic Model #4H (1943)
LATHE—Bamford-Chase Tool Room, 14"x6' Taper, Late.
Bridgeford, Engine, g. head, 32"x21' centers.
MILLER—Plain K. & T. #4K, Late.
PLANER—Cleveland Openside 60"x60"x20', Late.
Niles Bement Pond 48"x48"x26', 4 heads.
PRESSES—(2) Bliss #305, 100 ton, Late.
(2) Bliss #6, 125 ton, Late.
Clearing—200 Ton (1943)
Bliss #310—440 Ton
(1) Lake Erie, 750 ton, Hydraulic, Bed 72"x146" single or dble action, Late.
SHEAR—Barth (New) 54"x14 G
ROLLS—Bending 30"x½" Pyr. 10"x½" Pyr. 12"x¼" Initial.
WELDERS—(New) Sterling 10, 30 KVA, Bargain.

KINGS COUNTY
MACHINERY EXCHANGE
408 Atlantic Ave., Brooklyn 17, N. Y.
Dept. "A"
Phone: TRiangle 5-5237

HILL-CLARKE MACHINERY COMPANY



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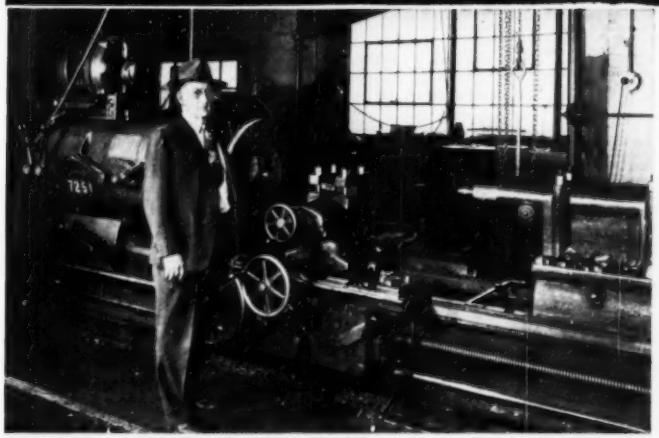

ECONOMY — QUALITY OF WORKMANSHIP are reasons The BAUER BROS. CO., Machinery Manufacturers, Springfield, Ohio look first to Hill-Clarke for dependable used machine tools. EDWARD A. ULLIMAN, SUPT. pictured beside a 36" Lodge & Shipley Lathe purchased from Hill-Clarke.

AUTOMATICS

No. 2 Brown & Sharpe
1¾" Greenlee, 6 Spdls. (1941)
No. 61 New Britain 6 Spdls. 1⅜" (1942)
No. 6 Brown & Sharpe
No. 49 New Britain, 4 Spdl. Chucker
Model A 2½" Cleveland (1943)
Model A 3¼" Cleveland (1942)

DRILLS

No. 150 Baker
No. D8 Colburn, No. 6 Morse Taper
No. 1LMS—20"—5 Spdl. Leland-Gifford
No. 2LMS—26"—1 Spdl. Leland-Gifford
No. 2LMS—14"—3 Spdl. Leland-Gifford
No. 2LMS—26"—4 Spdl. Leland-Gifford
No. 2LMS—26"—6 Spdl. Leland-Gifford
No. 4BL Natco 36 Spdl.
6'-12" Col. Fosdick Radial
7'-15" Col. American Full Universal

GEAR MACHINES

No. 61—A Fellows Gear Shaper (1942)
No. 7125 Fellows (1943)
No. 712 Fellows Auto Indexing (1943)
No. 72 Fellows Gear Shaper
No. 16 HS Gould & Eberhardt
No. 10H Gould & Eberhardt
No. 6 Gleason Gear Tester
12" Gleason Bevel Gear Cutter
37" Gleason Bevel Gear Planer
72" Cincinnati Gear Cutter

HORIZONTAL BORING MILLS

No. 31 Lucas, 3" bar
No. 46-B Heald Bore-Matic
No. 112—C Excello 2 Spdl.

GRINDERS

3"x12" Brown & Sharpe No. 5 (1944)
4"x12" Landis, Model H (1942)
6"x18" Norton Type C Plain (1943)
6"x30" Norton Type C Plain (1943)
10"-14"x36" Norton Type C Plain (1942)
10"x18" Norton Type C Plain (1943)
10"x48" Norton Type C Plain (1943)
Norton Motorized Grinders ranging from 6"x18" to 24"x240"
18"x48" Mattison Hyd. Surf. Gdr. (1942)
No. 3—8"x24" Covel Hydr. Surf. (1941)
No. 36-A Hanchett Rotary Surface
18"x48" Mattison (1948)
72A-3 Heald Internal Grinder (1942)
72A-5 Heald Internal Grinder (1942)

FOR YOUR PROTECTION only Hill-Clarke offers THIS 5 WAY GUARANTEE

1. A responsible organization—82 years experience.
2. A 58,000 sq. ft. plant equipped with complete and modern facilities plus experienced craftsmen for remanufacturing machine tools.
3. Modern machines—no worn out equipment.
4. You can see your machine tested under power before purchasing.
5. Hill-Clarke's unconditional money-back guarantee.

74 Heald Internal Gdr. (1942)
No. 5 Bryant Internal Grinder (1942)
No. 16-16 Bryant Internal Grinder (1942)
No. 16-38 Bryant Internal Grinder (1942)
No. 24-26 Bryant Internal Grinder (1941)

LATHES

15"x5' Sebastian, Grd. Head
16"x54" centers LeBlond (1941)
16"x60" centers Pratt & Whitney, Model B
18"x6' American, Grd. Head
19"-38" gap x 10' LeBlond
36"x30' Lodge & Shipley
36"—48"x16' Lehman Hydratrol (1945)
50"x17' centers LeBlond (1942)

LATHES (Production)

8"x15" Sundstrand, Model D (1943)
10"x16" Sundstrand, Model D (1942)
10"x22" Sundstrand, Model AA (1943)
16"x33" Fay Automatic (1942)
20"x25" Fay Automatics (1942)

MILLING MACHINES

No. 2 SP Van Norman Plain (1942)
No. 4 Cincinnati Plain (1943)
No. 2 H Milwaukee Vertical (1942)
No. 2 Cincinnati Vert. (1942)
No. 2M Cincinnati Vert. (1941)
No. 3 Cincinnati H.P. Vertical
Linley Vert. Miller No. 1 U. S Hand Miller
No. 1-18 Cinn. Mfg. (1940)
No. 2—18" Sundstrand-Electromil (1942)
No. M-24 Milwaukee Simplex (1942)
38"x40"x10' Fitchburg Duplex Miller (1943)
No. 4-48 Cincinnati Hyd. Tracer (1942)
No. 34-48 Cincinnati Hyd. Duplex
No. 45-48 Cinn. Hyd. Duplex
No. 56-72 Cincinnati Hydromatic
4½"x12" Pratt & Whitney, Model C
4"x9" Hanson-Whitney Univ. Thrd. Miller
6"x36" Lees-Bradner—Model HT (1943)
6"x48" Pratt & Whitney Thrd. Miller
6"x80" Pratt & Whitney Thread
6"x132" Pratt & Whitney Thread Miller
6"x168" Pratt & Whitney Thread
10"x48" Hanson-Whitney Thread
24"x24"x12' Ingersoll Adj. Rail
36"x36"x16' Ingersoll Slab Miller
No. 10 Ingersoll 72"x8' Travelling Col. Face Millers (1942)

MISCELLANEOUS

18" Dill Slotter
Model H-7 Micromatic Hydro Honer
Model H-2 Micromatic Hydro Honer
Model 200 Micromatic Hydro Honer
8-M Wells Band Saw
Model H-100 Micromatic Hydro Honer
Model 200—H5 Micromatic Horiz. Hone
No. 2 V & O open back press
Baush Radial Tapper (1942)
No. 304 Bliss Press

PLANERS

36"x36"x12' Cincinnati
36"x36"x18' Gray, 4 Heads
48"x36"x14' Gray
48"x48"x12' Cincinnati, 4 Heads

TURRET LATHES

No. 4 Gisholt Univ. Turret Lathe (1942)
No. 4R Libby, Bar Feed (1942)
No. H-5 Libby
No. 5 Bardons & Oliver (1942)
No. 5 Midland, Bar Feed (1942)
No. 2-A Warner & Swasey
No. 1-H Libby, 6¼" Hole in Spindle (1937)
No. 1-H Libby, Extra Long Bed (1942)
18" Libby, 3½" Hole in Spindle
No. 4A Warner & Swasey, 7½" Hole in Spindle

VERTICAL BORING MILLS

42" Bullard New Era
42" Colburn
60" Colburn
72" Niles Extra Heavy
84" Betts

FEATURE OF THE MONTH

This late model No. 36 A. Hanchette Automatic Rotary Surface Grinder gives you extra high production with savings in purchase cost. Inspect it at our plant now.

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A FEW MACHINES FROM OUR LARGE STOCK

AUTOMATICS
Brown & Sharpe #00G, H.S., #4, #6
Conomatic 8 sp. 1⅞" cap.
New Britain Gridley 6I—6 Sp. 2¼"

BORING MILLS
Giddings & Lewis #0, #25T, Bullard, 42" V.T.L.
Universal 3" horiz., Lucas #31 horiz.

DRILLS AND RADIALS
Amer. 4'-13" col. Radial, Canedy-Otto 3'-9" col.
Carlton 8'-19" col., Foote-Burt 6 Sp.
Cinci-Bickford Super Service, 21", 24"
Natco Model R-5 Multi-Spindle, 14 spindles
Sraley 24—28", Allen 6 Sp., Excelsior 21"

ENGRAVERS
Gorton #3U, 3Z, 3L; Deckel GI, GIF
Gorton Cutter Grinders #3-2, 2b5-5 Preis U. E.

GEAR EQUIPMENT
Fellows #72, 725 High Speed, Mlaren Gear Hobber
Michigan, Gleason, Fellows Checkers

GRINDERS—Miscellaneous
Brown & Sharpe #5 cyl., 3"x18", Black Diamond #4 Drill
Bryant & Jones #1, #3 Univ., #13 Univ. & Tool
Cincinnati #2 Centerless Automatic, 12"x20, 12"x40" Univ.
Covel #91A Univ. Tool & Cutter, Hammond #4 Carbide
Gardner #226, 20" disc, Heald #1 Tool, K. O. Lee Tool & Cutter
Landis 6"-H Cyl. 4x12", Landis #6 Thread, Centerless
Norton #2 Tool & Cutter, Porter Cable Belt WG8, G8
Norton Cyl. 6x18" Type C, 6x30" Type C
Oliver #310 Drill Pointer, Sellers #4G
Pratt & Whitney Radius #R6, Grenby Int.

GRINDERS—Surface
Abrasive #11½" wet Hand Feed, #34 Vertical, #35
Almetric 6x18" Power Feed, Foote-Burt Hammond
Blanchard #16—42" Chuck
Brown & Sharpe #2, #5 Hyd. 12x24" Cap.
G. & L. #18, 6x18" Hand Feed, #25, #35 Hyd.
Hanchett #-0U, 12x36", Mattison 14x16x48 Hyd.
Norton 6x18" Hyd., Pratt & Whitney 12x36" vert.
Reid #2A P.F., #2C Pope & Excello Spdl.
Thompson Hyd. 6x10x18", 6x12x18

LATHES
Bradford 16"x8', Hardinge Precision 9", cabinet
Hendey G. H. 16x30
Leoland Regal 19"x3'-½", 15x30", 19x48", 21x60"
Lodge & Shipley 16x-8" T.A., LeBlond HD 16x31"
Monarch 10"x20" EE, 16x28" T.A., 12x30" CKK
Rivett Precision, Logan 10"x30"
South Bend 9"x5', 9"x3'-½", 13x36", 10" Cabinet
Sebastian 12"x4', G.H., Sheldon 11x24, 1" collet

LATHES—Turret
Acme #6W Bar and Chuck, 6W Fox Lathe
Bardons & Oliver #3, #5, Foster #3B
Brown & Sharpe #1, #2F Hand Screw Mach.
Gisholt #4, 5 Bar & Chuck, Second Operation
Jones & Lamson #8A Univ., Hardinge ESM
Oster #60 Rapiduction, Morey #3, 1½" cap.
Warner & Swasey #3, #4, #4A—6" Bar Cap.

MILLS—Plain & Universal
Brown & Sharpe #2 Pl., #2A Univ.
Cincinnati #3 Plain, 2MH Univ., Dial Type
Milwaukee #2HL, 2H, Plain, #2HL, 2H, 3H Univ.
Van Norman #12, 20, 22L, 36

MILLS—Vertical—JIG BORERS
Brown & Sharpe #2, Index, Vernon, Bridgeport
Cincinnati #4 Dial Type, Jackson
Fosdick Jig Borer #42 Like New 1947
Gorton #8D, 9J Plain, #8½D Duplicator
Kearney & Trecker #5M, 3M High Speed
P&W 11½B Jig Borer, Sip Jig Borer #MP-5
Moore Jig Grinder
Morey #12M Profiler 2 sp.—Pratt & Whitney 12B

MILLS—Production
Brown & Sharpe #000, 12, 21
Cincinnati #1-12, 1-18, 2-18 Mfg.
Nichols Hand, U.S. MM 1, Kent Owens #1V
Snudstrand #00 Rigidmills, U. S. Duplex

PRESSES
Bliss #8 Dbl. Crank, Bed 42x100", 250 Ton
Bliss #67S, 645B, 650 Hi-Production, 304A, 305A
Bliss #40, 21 O.B.I., #41½ Double Action Cam
Bliss #58 o.B. Gap Frame #64, 62A, 1.2
Henry & Wright #5, 60, 75 Ton Dieing; Reliance 450 BI
Thomas 7A, 83 Ton O.B.I., Geo. Flex Elec. Screw
V. & O. #25S O.B.I., #102 Reducing, Z & H 30 Ton

MISCELLANEOUS
BAND SAW: DoAll Metalmaster, Tannewitz #36M
BENDING ROLL: Bunale #0, Excelsior #14
BROACH: 3L LaPointe Horiz. Hydr.
HACKSAW: Marvel #6A Automatic, #6, #4B
HAMMER: Niles Bement Pond 2500 lbs. steam
HONER: Micromatic #N-1 Hydrohoner, Sunnen
INJECTION MOLDER: Reed-Prentice #10D6, 6 ounce
IRONWORKER: Buffalo 25U x 20 Univ.
KEYSEATER: Witts & Merrill, Baker Davis
PRESS BRAKE: #253, #335 Chicago
ROUTER: Onsrud #W240, #55 Oliver
TAPPERS: Bakewell #1, Haskins #2C, 3C
THREAD ROLLER: Waterbury-Farrel #30 with Dies
WELDERS SPOT & SEAM: Sciaky, Thompson, T-W
WRAPPING ROLL: Buffalo #½

HYDRAULIC EQUIPMENT

Cap.	Manufacturer	Platen Stroke	Opening
500 Ton	Lake Erie	35x36"	66"
600	Bald. S'thw'k	76x59"	22" 30"
500 D.A.	H.P.M.	36x36"	24" 30"
1000	French Oil	53x42"	20" 50"
300	Brand New Watson Stillman Hobbing Press		
375 D.A.	Elmes	84x44"	12" 42"
350	Verson	46x40	36" 72"
50	Dennison	22x20	18 23
150	Southwark	34x30	30 2" to 4"

UP MOVING RAM PRESSES
50 & 100 Ton Stokes Molding Presses & Pumps
300 Ton Dunning & Boschert Molding Press
500, 800 Ton Waterbury-Farrel 3 & 4 Rod Presses

300 Ton Watson Stillman Press, 24x20" Platens, 400 & 500 Ton Shaft Straighteners—Self Contained

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MOLL MEMBER

LATE TYPE MACHINE TOOLS

AUTOMATICS
6" RPA — 6 spindle Acme-Gridley Chucker, 1941.
16" Bullard Mult-Au-Matic, 6 spindle, Type D, 1941.
1⅝" Greenlee, 6 spindle. 1942.
9/16" RA-6 Acme Gridley, 6 spindle. 1942.

BORING MACHINES
No. 42 Lucas Horiz. Boring Mill. 1940.
No. 54 Excello Way Type Duplex End. 1940.
No. 49 Heald "Borematic", 1942.

BROACHES
No. CPC-30 Lapointe Vertical. 1941.
No. V-2 American Vertical. 1943.

DRILLS, HEAVY DUTY
25" Fosdick "Economax", 1941.
No. 121 Baker. 1941.
W-6 Baush Hyd. Multiple Spindle. 1943.

DRILLS, RADIAL
4'11" American Hole Wizard. 1943.
4'9" Cincinnati Bickford. 1944.
3'9" Cincinnati Bickford. 1946.

GEAR EQUIPMENT
No. 12B Gleason Gear Rougher. 1943.
3" Gleason Gear Generator. 1942.
No. 6 & 17 Gleason Gear Testers. 1943.
12" Red Ring Internal Gear Shaver. Late.
No. GCL-3 Red Ring Gear Shaver. 1942.
No. 7125A Fellows Gear Shaper. 1943.
Vinco Spline & Gear Grinder. 1942.

GRINDERS, CYLINDRICAL
16"x36" Cincinnati Plain. 1942.
12"x48" Cincinnati Universal. 1943.
10"x72" Landis Type C Plain. 1942.

GRINDERS, INTERNAL
No. 74A Heald Extended Bridge. 1941.
No. 72A3 & A5 Heald Plain. 1944.
No. 16A22 Bryant Hole & Face. Late.

GRINDERS, SURFACE
14"x36" Pratt & Whitney Vertical. 1938.
No. 22 & 25A Heald Rotary. 1943.
No. A1-8 Arter Rotary. 1942.

LATHES, ENGINE
42"x192" Axelson. 1942.
24"x168" Sidney. 1942.
18"x54" Lodge & Shipley. 1943.
14"x78" Reed Prentice. 1942.
14"x30" Lodge & Shipley. 1943.

LATHES, PRODUCTION
Gisholt "Simplimatic" motor & control. 1943.
No. 3A Lodge & Shipley "Duomatic", 1943.
20"x25" Fay Automatic. 1942.
10"x22" Sundstrand, Model 10, & 12. 1942.
12"x18" Lipe "Carbo". Late.
14"x42" Monarch "Magna Matic". 1941.
2FU Foster Fastermatic. 1943.

LATHES, TURRET
36" Bullard Vertical. 1946.
No. 2A & 3A Warner & Swasey. 1943.
No. 9A Jones & Lamson. 1942.
No. 3L Gisholt. 1941.
No. 2, 3, 4 & 5 Warner & Swasey. 1943.
8½"x24" Acme Universal. 1943.

MILLS, PLAIN
No. 5 Cincinnati High Power. 1943.
No. 4H & 4K Milwaukee. 1943.
No. 3 Van Norman Plain. 1942.
No. 2HL Milwaukee. 1942.

MILLS, PRODUCTION
No. BL-2420 P & W "Keller", 3 spindle. 1942.
No. BL-2416 P & W "Keller", 1 spindle 1943.
No. BG-1 "Keller", single spindle.
No. 1848 Kearney & Trecker "Simplex" 1942.
No. 1248 Milwaukee "Simplex". 1942.
No. 1-18 & 2-18 Cincinnati. 1942.

MILLS, THREAD
6"x60" Pratt & Whitney. Latest.
12"x54" Lees Bradner. 1942.
8"x16" Hanson-Whitney. Late.

MILLS, UNIVERSAL
No. 2L & 2MH Cincinnati. 1942.
No. 2H Milwaukee. 1942.
No. 26SU Van Norman. 1942.

MILLS, VERTICAL
No. 3H & 3K Milwaukee. 1942.
No. 2 & 3 Cincinnati. 1941.
No. 2K Milwaukee. 1942.

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TYPICAL MACHINES

No. 41 Lucas Horizontal Boring Machine
14' Niles Tool Works Boring Mill
42" Bullard Vertical Turret Lathe
No. 49 Heald Bore-Matic, Double End
No. 47A Heald Bore-Matic, Single End
No. 46B Heald Bore-Matic, Double End
6'-17" Column American Radial Drill
No. 28L Natco Multiple Spindle Drill
No. 2 Avey 4-Spindle Drill
No. 2KH 6-Spindle Allen Drill
No. 3 Foote-Burt Sensitive Drill
No. 13 Brown & Sharpe Tool & Cutter Grinder
No. 7 Badger Double-End Disc Grinder
No. 214 Besly Double-End Disc Grinder
No. 16-16 Bryant Internal Grinder
No. 72A Heald Plain Internal Grinder
10"x36" Cincinnati Cylindrical Grinder
6"x18" Norton Type C Plain Cylindrical Grinder
6"x18" Norton Vertical Spindle Surface Grinder
No. 10 Blanchard Rotary Surface Grinder
No. 11 Blanchard Rotary Surface Grinder
No. 16 Blanchard Rotary Surface Grinder
No. 25A Heald Rotary Surface Grinder
No. 3 Brown & Sharpe Universal Grinder
No. 2 Cincinnati Centerless Grinder
25"x192" BC Axelson Engine Lathe
1H-18 Kearney & Trecker Manufacturing Mill
M24 Kearney & Trecker Manufacturing Mill
2HL Kearney & Trecker Horizontal Plain Mill
2H Kearney & Trecker Horizontal Plain Mill
No. 3 Cincinnati Plain Horizontal Mill
No. 3H Kearney & Trecker Plain Horizontal Mill
No. 3 Van Norman Plain Horizontal Mill
No. 4 Cincinnati Dial Speed Plain Horizontal Mill
No. 5 Cincinnati High Power Plain Horizontal Mill
Bridgeport Vertical Mill
No. 2 Cincinnati Dial Type Vertical Mill
2K Kearney & Trecker Vertical Mill
48"x48"x12' Liberty Openside Planer
66"x48"x12' Cincinnati Double-Housing Planer
6R Denver Acme Ram Type Universal Turret Lathe
3-J Gorton Pantograph

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MACHINE TOOLS

BORING MILLS—Horizontal
CINCINNATI GILBERT 3½" bar, floor type, latest
DETRICK & HARVEY 6" bar, Floor Type, M.D.
GIDDINGS & LEWIS #25T, 2½" Bar—latest
GIDDINGS & LEWIS #55, 5" Bar, Table Type, latest
LUCAS #41, 3" bar, Table Type, Latest Type
NILES BEMENT POND 5", 8", bar, fl. type, M.D.
UNIVERSAL 3" bar, high speed, latest type
BORING MILLS—Vertical
BETTS 126", 2 swivel heads, AC, Motor Drive
BULLARD 24", 26", 42", "Spiral Drive", Latest
BULLARD 62" Maxi-Miller", 2 heads, Motor Drive
BULLARD 8" 8 spdl, Mult-Au-Matic, Type J, Latest
BULLARD 16" 6 spdl, Mult-Au-Matic, Type D, Latest
BULLARD 12" 6 spdl, Mult-Au-Matic, Type D, Latest
COLBURN 72", 2 Swivel Heads, PRT, M.D.
KING 62", 2 swivel heads, PRT, M.D.
NILES 100", 2 swivel heads, PRT, DC, M.D.
DRILLS
AMERICAN 4' arm 11" column, "Hole Wizard", latest
LELAND & GIFFORD #2LMS, 6 spindle, latest
GEAR CUTTING EQUIPMENT
FELLOWS #6A, #7, #7A, #72, #75, #77 High Speed Gear Shapers, latest type
FELLOWS #Z, #6Z2, Gear Shaper, latest
GLEASON 2" 12" straight bevel generator, Latest
GOULD & EBERHARDT #12H, Hobber, Latest
GOULD & EBERHARDT #26H, Hobber, with diff., M.D.
SYKES #1½, 18" Cap., Herringbone, M.D.
GRINDERS—Cyl.—Plain & Univ.
BROWN & SHARPE #1, 2, 3, 4, Universal, Latest
LANDIS 6x12, Type B Plain Hyd., Latest
NORTON 6x18", 10x24", 14x36" Type C, Plain, latest
NORTON 8"x36", 10"x36" type C, Plain Hydr., Latest
GRINDERS—Miscellaneous
BRYANT #16-CP-16, #24 Int. Hyd., latest
CINCINNATI #2 Centerless "Thrulomatic", latest
CINCINNATI Centerless Lapper, Model ED, Latest
COVEL #22 Universal Tool & Cutter, Latest Type
HEALD 72A, 72A3, 72A5, 72A Internal, latest
LANDIS #12 Centerless, Hydraulic latest type
GRINDERS—Surface
HANCHETT Series 300, 12x18" Vert. spdl Hyd., latest
HEALD #22 Rotary, 12" chuck, latest type
HEALD 25A—rotary—16" and 20" chuck, Hyd., latest
THOMPSON 12x12x24 Model B Hyd., Latest Type
LATHES—Engine & Mfg.
AMERICAN 26"x30" centers, 2 carriages, motor dr.
LEHMANN 16x30" centers, TIMKEN, latest type
MONARCH 12"x54" centers, Timken, Latest Type
MONARCH 10"x20" centers, Model EE, Timken, latest
MONARCH 16"x72" centers, Timken, Latest type
MONARCH 22"x156" centers, Timken, M.D.
NILES 30x50" Boring, Timken, Latest Type
PRATT & WHITNEY 14"x54" centers, 10"x30" centers, Type C, Timken, Latest
SPRINGFIELD 16"x30" centers, Timken, Latest Type
LATHES—Turret
BARDONS & OLIVER #5, #7, Timken, Latest Type
FOSTER #4FU "Fasternatic" Timken, Latest
GISHOLT #1L, #2L, #3L Universal, Timken, Latest
GISHOLT #3, #4 Univ., TIMKEN, Latest Type
JONES & LAMSON #3, #5 Univ., Timken, Latest
LIBBEY "International" 1-H5, Univ., Timken, latest
MOREY No. 2G, No. 3, No. 4, Timken Bearing, latest
WARNER & SWASEY #1, 2, 3 Ram—Timken, latest
WARNER & SWASEY #2A Universal, Timken, Bar & Chucking, Latest Type
WARNER & SWASEY No. 4A, 8" bar, serial over 1,000,000, Latest Type, New 1947
MILLING MACHINES—Plain
BROWN & SHARPE #2, Light Type, Timken, latest
BROWN & SHARPE 2B, 3B, Timken, Latest Type
CINCINNATI 0-8 Auto., Rise & Fall, Latest Type
CINCINNATI #4 TIMKEN, Motor Drive
CINCINNATI 4-36, 2-18 Hydromatic, Simplex, latest
KEARNEY & TRECKER 2H, 3H, 4H, Timken, latest
KEARNEY & TRECKER #3, 4, Hyd., Timken, M.D.
KEARNEY & TRECKER 1404 Simplex, Latest
KEMPSMITH #3G, Timken, latest type
MILLING MACHINES—Vertical
BROWN & SHARPE #2, Timken, latest type
CINCINNATI #2 Dial Type, Timken, latest type
GORTON #8½D, 9J high speed, latest
KEARNEY & TRECKER #3H, Timken, Latest
REED PRENTICE 3VG, with duplicator, Latest
POWER SHEARS
NIAGARA #3120 10 gauge 10', M.D.
WYSONG & MILES #372 14 gauge 6', Latest
POWER BRAKES
CINCINNATI Series 500 ½"x8'6", Motor Drive
CINCINNATI Series 50 3/16 x 8', Latest Type
CINCINNATI Series 50 ⅜" x 6', Latest Type
VERSON #206 10 gauge x 96", Latest Type
SCREW MACHINES—Automatic
CLEVELAND 9/16", 1¼" model A, high speed, latest
CONOMATIC 6", 4 spindle, latest type
CONOMATIC 9⅝"—6 spindle, Latest Type
GOSS & DeLEEUW 8" auto. Chucker, latest
MISCELLANEOUS
AJAX 2" 3¼" Forging and Upsetting, M.D.
AMERICAN V-2, 6 ton 26" stroke Vert. Broach, latest
BARNES #17B, 306H, 307 Vertical Hone, Hydraulic, Self-Oiling, Latest Type
CINCINNATI 1-30, 3-30 Duplex Vert. Surface Broach, Double ram, Model ER, Hyd., Latest Type
FOSDICK Model 6A Jig Borer latest type
LAKE ERIE 500 ton Vertical Hydraulic Press, latest
NILES "Time Saver" 48"x18"x12' Planer—3 heads, Box Table, P.R.T., Latest Type
PRATT & WHITNEY—KELLER® Type BL-2416 & Type G Copying, latest type, 2 & 3 Dimensional
PRATT & WHITNEY 6 x 60 Thread Miller, latest
QUICKWORK 3" x 1" cap. Rotary Shear—M.D.

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PRESSES

Toledo #39, 255-ton St. Sided, Dbl. Gr., 4-pc. Steel Tie Rod Constr.—bed F to B x L to R 36¼" x 35" — Opening in bed 22" x 22" — stroke 18".

Billings & Spencer #2 Trimming—bed F to B x L to R 20" x 22"—hole in bed 10"—stroke 2½"—side shear.

PLAIN MILLER (late)

Van Norman #26 Ram Type—wkg. tbl. 50" x 12"—range 28" x 0" x 19"—(attchmts).

Brown & Sharpe #2 Lite type—wkg. tbl. 50½" x 10"—range 28" x 10" x 15"—rapid traverse.

Van Norman #22 Ram Type—wkg. tbl. 40⅝" x 11⅝"—range 27½" x 11" x 15½"—Div. Hds.—Slotting attchmt.

GRINDERS

Brown & Sharpe #1, 10" x 20"—#2, 14" x 30" and #3, 14" x 40" Univ. (late) with attchmts.

Cinn. #2 Centerless Film. Brg.—cap. 1/16" to 3½" dia. short wk.; ⅛" to 2" dia. bar wk.—long bar attchmt.—auto. infeed attchmt.

TURRET LATHES

Cinn.-Acme 17" x 4½", cross sliding turret. Heavy Univ.—44" bar length—4¾" hole

Gisholt #5 Ram Type Univ. Preselec. Hd.—2-25/32" hole—24" Turning length—19½" swing over ways—bar & chucking (quantity of tooling).

MISCELLANEOUS

Niles-Bement-Pond 62" Vert. Boring Mill—2 hds. on rail—42" Vert. range—63" swing—M.D.

National Acme RA-9 16", 6-spindle, 289 to 2885 RPM, quantity of tooling (late)

National 3", 5" & 7½" Upset Forging Machines.

Rafter Power Squaring Shears—
available in two sizes
¼" x 10' Mild Steel
⅛" x 10' Stainless Steel
3/16" x 12' Mild Steel
3/32" x 12' Stainless Steel
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No. 25T G. & L., 2½" table Hor. Mill, 1942
4" Univ. Table Mill, 60" vert., 96" hor., 1943
36" & 42" King Side Hd. Vert. Mills, '43
Nos. 1A & 3 W. & S. Turrets, bar & chuck
No. 4 Gisholt Turret, bar & chuck, '42
3' 11" Fosdick & 3' 9" Amer. Radials, '43
28/60 Cinci. Hydrotel Vert. Miller, 1 spin., 360° Cinci. 4 Spin. Profiler, 1942
Nos. 3 & 2MH Cinci. Pl. Dial Millers, late
Nos. 3K & 3H K. & T. Pl. Dial Millers, late
No. 3G Van Norman Pl. Miller, ram, '43
No. 2G Kempsmith Univ. Miller, 1943 (3)
No. 2416 Keller Duplicator, late
Nos. 9J Gorton Duplicator & Vert. Miller (2)
Bridgeport Vert. Miller, slotting (3)
12"x24" G. & L. No. 45 Surface Grinder, '42
No. 70A Heald Internal Grinder, 1942
Gear Cutter, No. 13 B. & S., spur & bevel

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30 Church St., New York 7, N. Y.

ALL PRICES DRASTICALLY REDUCED!!
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5 Ton SHEPARD & NILES Crane, 27' Span, amag!

All above with A. C. motors.

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IMMEDIATE DELIVERY, BRAND NEW

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6'	18 ga.	249.00
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All steel construction. Sizes available from 4'. Prices f.o.b. factory.

2000 Ton BLISS HYDRAULIC, 3 column type 12" stroke, 110" dia. bed, 1942 model, for sale, less than ½ cost.

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SPOT WELDERS, air operated or foot operated, brand new, fully guaranteed nationally known manufacturer. Example: Present factory price $281.00 for 5 KVA, our special price $217.00.

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Built for Russian Gov't—Unable to deliver due to national conditions—20—16"x54" centers — 18" swing — weight 2½ tons—regular comparable $6,000.00 value. Sold at reduced price as long as they last in this size only.

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3'-9" American "Hole Wizard" Radial
10"x48" Norton "C" Plain Grinder
#70-A Heald Internal Grinder
Model 2-H Micromatic Hydrohoner
#3H Milwaukee Plain Miller
#3MS Cincinnati Miller
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HAZARD BROWNELL MACHINE TOOLS INC.
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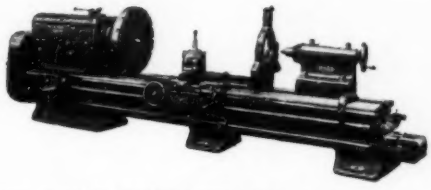
SIMMONS ENGINEERED Machine Tool REBUILDING NEWS

SIMMONS MACHINE TOOL CORPORATION • MAIN OFFICE AND PLANT, 1759 N. BROADWAY, ALBANY, N. Y

30" x 16' NILES "TIMESAVER" LATHE



Write today for Complete Current Stock List of Simmons Engineered-Rebuilt Machine Tools

30" x 16' (108" centers) Niles TIME-SAVER Screw Cutting Engine Lathe. 12-speed geared head, anti-friction bearings, tapered spindle nose, power rapid traverse, taper attachment. Normal spindle speed range RPM 3.94 to 232, 20 H.P. AC or DC motor and magnetic starter with push button station.

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UNUSUAL VALUES

Milling Machines—No. 1, Universal, No. 1 American (new) plain, No. 1 Vertical.

Drills—Large selection, single and multiple spindles also bench types, many of them new.

Gear Cutters—Brown & Sharpe No. 3—26" Gould & Eberhardt 42".

Grinders—Cylindrical B & S No. 11, Planer type 10"x36" Surface 18"x63", also new (small) Universal bench and floor type. All with coolant, motorized.

Lathes—14"x6', 8', 10'—16"x6', 8', 10'—18"x6', 8', 10'—20"x16'—all cone drive, several motorized also (new) 18"x8' and 10' geared head, motorized.
Large stock 10" and 18" bench and floor type.

Planers—Single head 21"x6', 24"x8', 26"x8'.

Shapers—16", 20", 24", B.G. crank.

Turret Lathes—J & L 2"x24"—2"x36" also Acme, W & S Turret (vertical) boring and facing mills, 5 hole turrets, 36", 46".

SPECIAL—New totally enclosed dust proof, fan cooled, ball bearing saw arbor motors, plain shafts to size or threaded, and with collars, measures only 5¼" from center of shaft to flatted top (1 h.p. to 15 h.p.) 2 or 3 phase, 3600 r.p.m.

WOOD WORKING MACHINERY—A very large stock of new and re-built, practically all motorized. New Motorized overhead cut-off and miter saw for wood, plastics, steel, aluminum and other metals. The above list is only a fraction of our stock which changes almost daily, therefore, tell us definitely what you want since we are adding considerable number of machines to our stock which are too many to list. What we have today may be sold tomorrow, so a list is really not dependable.

Drill—Foote-Burt No. 25 24" Hi Duty 5" capacity in steel. Motor attached.

PATTERN MAKING MACHINERY—42"x16' bed wood lathe, compound rest, rack and pinion feed to carriage; 16" heavy duty jointer, extra long bed, front table tilts for giving draft to pattern work; tilting table also tilting arbor rip and cut-off saws; band saws; jointer; floor and bench type trimmers; and also many other machines for pattern work.

THE OSBORNE & SEXTON MACHINERY CO.
P. O. Box 88, Columbus 16, Ohio

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LATE TYPE MACHINE TOOLS

THE GENERAL MACHINE SHOP of TITUSVILLE, PENNSYLVANIA has authorized us to sell at a PRIVATE LIQUIDATION SALE their surplus late type MACHINE TOOLS on a first come, first served basis.

PARTIAL LIST INCLUDES

No. 340T GIDDINGS & LEWIS Table Type Horizontal Boring Mill, 4" bar, 2" auxiliary spindle, 1943

No. 4H LIBBY Turret Lathe, 12" hole in spindle, 3 and 4 jaw chucks, 1943

No. 4A WARNER & SWASEY, full leadscrew, taper attach., tooling, 1942

No. 3A WARNER & SWASEY, bar feed, taper attach., threading attach., tooling, 1942

No. 2A WARNER & SWASEY, bar feed, taper attach., threading attach., tooling, 1942

No. 2A WARNER & SWASEY, bar feed, 4' extra bed length, taper attach., steady rest, 1941

24" GOULD & EBERHARDT "Industrial" Shaper, 1942

5'-15" col. AMERICAN "Holewizard" Radial, box table, 1942

16"x54" LODGE & SHIPLEY Toolroom Lathe, taper, chucks, 1943

36"x20' bed AMERICAN High Duty, Timken spindle, Engine Lathe, 12' centers, 1942

No. 3 CINCINNATI Dial Type Milling Machine, vert. head, 1941

No. 5 CINCINNATI High Power Milling Machine, vert. head, 1943

No. 24 BRYANT Internal Grinder, 1942

10 ton DOMINION Crane, 42' span, AC motors, 1941

In addition to the above machines there are many other Lathes, Milling Machines, Drill Presses, Tool & Cutter Grinders, Planers and Shapers. In all, there are sixty-five machines available in this plant.
All machines motor driven 3/60/220/440

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Bor. Mill. Hor. 3" G & L ND. 4½" N-B-P—MD.
Boring Mills, 24"-30"-42"-52"
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Lathe, Turret 3-A W and S. S.P.D.
Millers, Plain No. 3 K and T. No. 4 Cin.
Millers, Vertical No. 3 and No. 4 Cin.
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Shears, 42"-60"-72"-132"
West Penn Machinery Company
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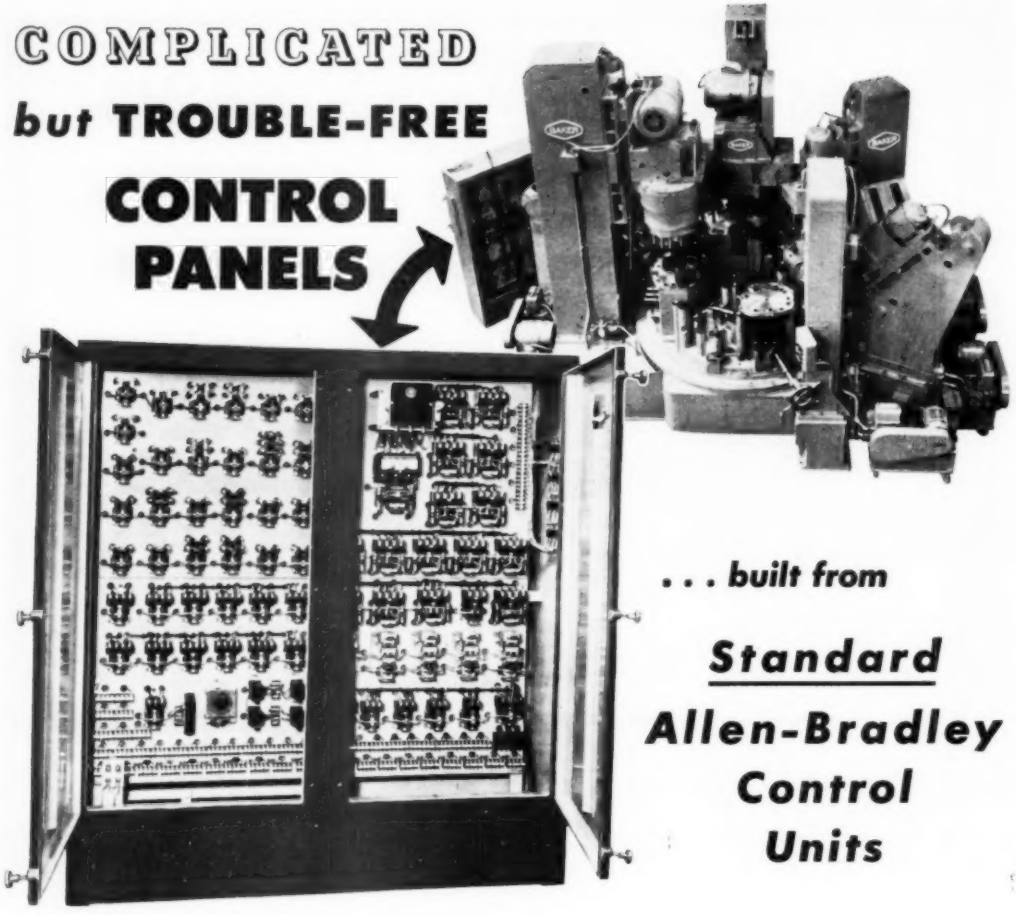
but TROUBLE-FREE
CONTROL PANELS



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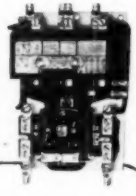
The advantages of automatic electric control cannot be fully realized unless relays, starters, timers, etc., are mounted on special control panels . . . engineered to fit your particular machine. Such special panels, made by Allen-Bradley from standard components, provide correct sequence control, greater safety for operators, and lower installation and maintenance costs.

Allen-Bradley control engineers are available to machinery builders for control engineering counsel. They will gladly cooperate with you in developing the special controls required by any special machine you may design. Allen-Bradley Co., 1310 S. Second St., Milwaukee 4, Wis.



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A-B Quality

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

QUALITY

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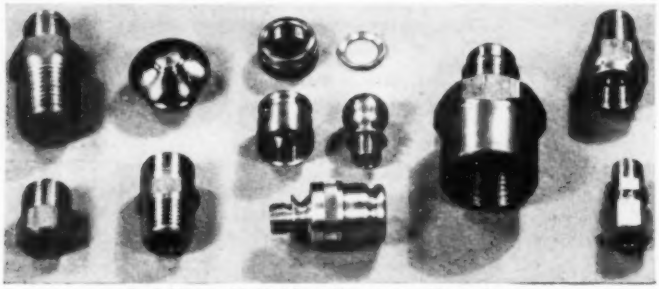
COPPER ALLOY BULLETIN

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared Each Month by BRIDGEPORT BRASS COMPANY "Bridgeport" Headquarters for BRASS, BRONZE and COPPER



Leaded brass rod is ideal for making screw machine products

Speeding Up Machining Operations

The addition of varying amounts of lead to brass, bronze and nickel silver will quickly speed up machining operations involving the removal of excess metal by turning, milling, drilling, tapping, etc.

Lead does not dissolve in copper-base alloys. It is found as tiny particles or spheroids of free lead scattered throughout the metal.

Lead Breaks Up Chips

Even a small amount of lead has a pronounced effect on the character of the chips. Without lead, most copper-base alloys generate curly, stringy chips which cling to the tool and work and tend to clog the machine. Since lead breaks the continuity of the matrix, it causes chips to break apart more easily. In amounts over 2%, the chips crumble and resemble sawdust. It reduces the hot workability of metals—not so much with Muntz (60% copper and 40% zinc) but higher copper content alloys.

Lead also cuts down cold workability in proportion to the amount present. Where a compromise between much ductility plus some machinability is required, small amounts of lead from 0.15 to 0.50% are added.

Leaded Rod in Stock

Ledrite free machining brass rod, which contains about 61% copper, 3.5% lead and remainder zinc, is considered the easiest machining of all the copper-base alloys. Since it has a machinability rating of 100%, the alloy is used as a standard to compare machinability of other metals.

Ledrite free-cutting brass rod meets about 90% of all requirements for screw machine operation. Large stocks in a variety of sizes and shapes are carried at the mill and by district warehouses for immediate deliveries.

Fabricator and Laboratory Must Work Together

Operations which call for machining plus some cold working such as knurling, forming, expanding or roll threading may require Ledrite 2 with 1.8% lead which has a machinability rating of about 90%.

Today, close contact between the fabricator and the laboratory is more necessary than ever. Mass production with low unit cost depends largely upon the use of metal with "made-to-order" properties designed for the job in question. Call on us for help on all your metal problems to reduce costs or improve your product.

Bridgeport Warehouse Service

Are you making adequate use of Bridgeport Warehouse Service?

Large stocks of brass and copper mill products carried in Bridgeport warehouses at Chicago, Cleveland, St. Louis, Minneapolis, Newark, Providence, Houston, Denver, Los Angeles and San Francisco complement the mills at Bridgeport, Conn., and Indianapolis.

Here are six ways that our warehouse service can help you:

1. *Emergency Shortages*—Whenever additional metal is needed to finish a job it can be picked up quickly without interrupting production.

2. *Rush Orders* – Use warehouse stocks as a fill-in while waiting for mill shipments.

3. *Short Runs*—Metal should be obtained from warehouses instead of waiting for mill to make up small lots to order.

4. *New Products and Trial Runs*—Buy as much or as little as you require until experimental stage is completed.

5. *Slitting Service* – Should be used for converting any stock you may have on your shelves to usable widths. This also makes Bridgeport warehouse stocks more flexible.

6. *Cautious Buying* – Warehouse stocks should be used for hand-to-mouth purchasing.

Bridgeport's Warehouse Stocklist will be mailed upon request. This booklet also contains a valuable technical digest on the properties of most commonly used copper-base alloys.

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BRIDGEPORT 2, CONNECTICUT
Established 1865
"Bridgeport" *District Offices and Warehouses in Principal Cities*

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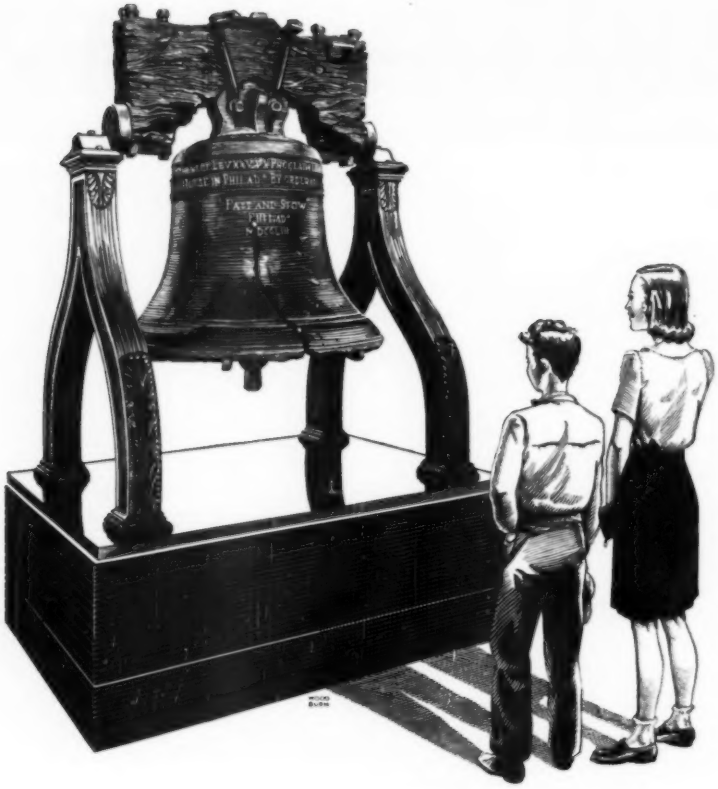

What price liberty?

IT was Daniel Webster who said, "God grants liberty only to those who love it and are always ready to guard and defend it."

Today in our yearning for "security", we are inclined to forget about that "liberty" for which this old bell rang out. The two are not synonymous. When we permit a benevolent government to assume more and more responsibility for housing, feeding, hospitalizing, and even entertaining our citizens, we must in return expect to surrender more and more of our personal rights and liberties.

Actually, the only security any man can enjoy with liberty is the security he earns through his own initiative, resourcefulness and productivity. As community leaders, it is our responsibility to help our fellow citizens realize that for the delusion of government-guaranteed security they are sacrificing liberty.

The Youngstown Sheet and Tube Company

General Offices -- Youngstown 1, Ohio
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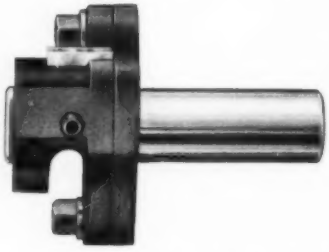
New BOYAR-SCHULTZ UNIVERSAL ADJUSTABLE POINTING TOOL!!

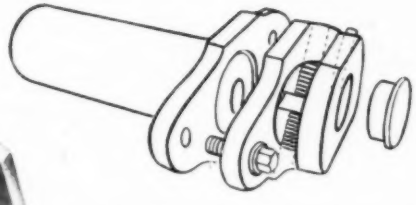
POINT with pride to the jobs you run



Heretofore Pointing has been a "headache" in screw machine work—a job to be avoided because clean, concentric POINTS were hard to obtain when working with combination form and cut-off tools or conventional type pointing box tools. With the New Boyar-Schultz Universal Adjustable Pointing Tool you need no longer fear wasteful "down time" in order to Point perfectly. Neither is it necessary to add to set-up costs by making or buying special form tools.

THESE FEATURES MAKE IT A SUPERIOR TOOL

1. Universal—Same Tool can be used for right or left hand jobs. Four easily accessible set screws bring in Tool Bit from right or left.
2. Adjustable to compensate for misalignment between turret and spindle.
3. Special Rectangular FLAT Tool Bit can be ground with four shapes which can be sharpened by taking a cut off the flat side, like a flat form tool.
4. Easy Adjustment brings Tool Bit back to center after sharpening.



A time saving Screw Machine Tool, designed to do a difficult job

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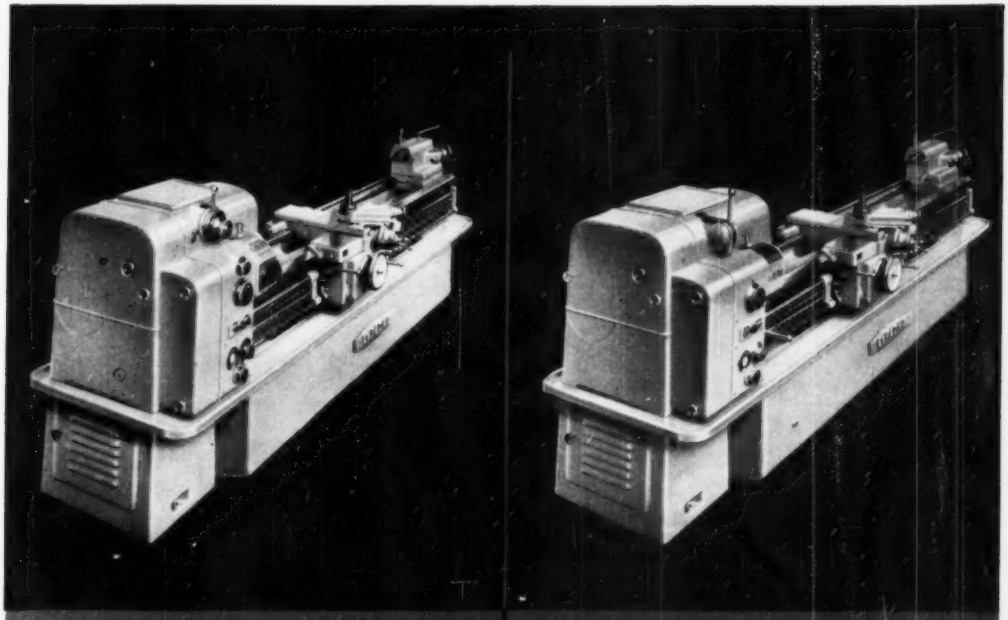

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Tool Room Lathe with over 300 spindle speeds 6 to 1500 rpm obtained through variable speed drive.

16" LeBlond Model RT
Heavy Duty Engine Lathe with 16 spindle speeds 30 to 1537 rpm or 20 to 1025 rpm.

The RT's represent an entirely new approach to engine and tool room lathe construction and operation. Utilizing the combination gear-belt drive headstock, they deliver speeds as low as 6 rpm and as high as 1537 rpm, can therefore perform a broader scope of work. Both are built with 4-directional power rapid traverse, enclosed quick change box, one-piece apron (combined feed apron optional), hardened and ground steel bed ways, thrust-lock tailstock with spindle travel dial, and many other modern lathe advantages.

for complete information

use our catalog in Sweet's File for Machine Industries, or send for bulletins RT-31 and HD-30-A.

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LARGEST MANUFACTURER OF A COMPLETE LINE OF LATHES.
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HARD!

—can be oil quenched to a maximum hardness of 64/66-Rockwell C in moderate sections.

EASY TO MACHINE!

—has fully spheroidized structure.

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